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Aims & Scope

Traditionally, it is seen that change and transformation in the field of social sciences takes a little more time compared to fields such as health, technology and engineering. However, this situation seems to have started to change with the Covid-19 epidemic disease. It is expected that changes will occur in human and social behavior during and after the Covid 19 epidemic disease. These changes have started to show themselves in many fields related to social sciences, especially education, psychology, sociology and economy. For this reason, this conference focused on the changes and innovations in the field of social sciences that started with Covid 19. However, the organizing committee also recognizes the value of traditional knowledge in the social sciences. For this reason, the conference is also open to traditional studies in the field of social sciences.

The aim of the conference is to bring together researchers and administrators from different countries, and to discuss theoretical and practical issues in all fields of social sciences. At the same time, it is aimed to enable the conference participants to share the changes and developments in the field of social sciences with their colleagues.

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ICRESS 2023: International Conference on Research in Education and Social Sciences

Determination of the Relationship between the Vocational Qualifications and Academic Programs on a Perceived Competencies Basis Approach: A Case for Geographical Information Systems

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Abstract: GIS education and training activities become widespread as GIS utilization inevitably increases worldwide. Besides, vocational standards and qualifications are developed to form a quality assurance basis for GIS-related jobs and services and the employment of qualified personnel. From this perspective, this study aims to examine to what level the graduates of GIS associate degree, master, and doctorate programs have gained the necessary knowledge and competencies defined in the GIS Specialist (Level 6) National Qualification throughout their academic education. Within this context, an online survey was developed based on 43 performance criteria derived from the vocational qualification units (A1, A2, A3). The respondents were asked to self-evaluate the achievement of the given criteria during their academic education on a 5-point Likert scale. It was detected that 39.1% of the 174 survey participants have associate degrees, 61.7% have master's degrees (with thesis, without thesis, and distance education), and 6.9% have doctorate degrees. In comparison, 3% of them completed the GIS certificate program. The results showed that the competency achievement perceptions in the A3 section increased following the education level of the graduates. No significant difference was determined for A1, while an insignificant difference was detected for the A2 unit between the graduates of doctorate and distance education master's degree programs. The results are expected to be adopted by the relevant parties to align the GIS education programs with the sectoral needs and vocational qualifications.

Keywords: Vocational qualifications, Geographical information systems, GIS specialist, Learning outcomes

Introduction

Geographical information systems (GIS) is an eminent tool for understanding and supporting the solutions developed for the sustainability of the Earth (Andreev, 2020). GIS provides and enormously facilitates the processes reserved for capturing, manipulating, storing, managing, analyzing, and visualizing the geospatial data that are inevitably necessary for various disciplines and fields (Goodchild, 2000). Therefore, although the very start of the development of the GIS methods, tools, and sectors are primarily related to physical planning and spatial analysis activities and implementations, today, it has become a common tool for a wide range of fields (Maliene et al., 2011). Within this journey, the definition of the competencies required for GIS-related works and the need to raise qualified GIS personnel have become important, especially after the 1980s when GIS

education and training programs became widespread in the universities and the GIS sector (Coopock & Rhind, 1991). Kholoshyn et al. (2019) explain that following the initial attempts and academic research at the Laboratory for Computer Graphics and Spatial Analysis, Harvard University, GIS has already been effectively included in the education system worldwide at the beginning of the 21st century, especially after the developments in universities in the USA, Canada, and the UK. Easy and fast access to geospatial data and technologies, advancements in geographical data infrastructures, and the existence of web-GIS resources have made GIS an inevitable tool for even secondary education today (Gonzáles & Torres, 2020).

GIS is multidisciplinary, comprises diverse information, knowledge, and competency areas, and GIS education is often organized under varying curricula (Bowlick et al., 2019; Hodza et al., 2021). The reflections of this rich and complex structure can be observed in the efforts of developing geospatial competencies through the UC Geographical Information Science and Technology Body of Knowledge, DOLETA Geospatial Technology Competency Model, Geospatial Management Competency Model (Alrwais, 2023; Cabuk, 2019), as well as certification implementations of GIS Certification Institute, American Society for Photogrammetry and Remote Sensing, US Geospatial Intelligence Foundation, etc. (Cabuk, 2019). Njiru et al. (2022) address the Slim GIM framework, Urban and Regional Information Systems Association (URISA) GIS CMM, and PSD Geospatial Maturity Index along the GIS-based models defining GIS capabilities within the enterprise level. Even the diversity and the unclarity of the GIS personnel employment calls from different sectors and projects put forward the necessity to align better the framework of GIS-related jobs and the minimum requirements for GIS training and education programs. In the education and training side, many academic programs in many countries currently provide GIS-related degrees. At the same time, there are also certification implementations and/or vocational qualification systems to provide quality assurance for the relevant jobs (Pesaresi, 2019). Wikle and Sinton (2020) note that the GIS certification, which first started in universities in 1990, is the most common academic credential for students who finish a set of courses at hundreds of public and private institutions. However, they widely vary in terms of knowledge and competencies they address.

In Turkiye, since the beginning of the 2000s, there have been intensive national efforts to develop standards for GIS, spatial data infrastructures, legislation, policies, and human resources under the framework of the Turkish National Geographical Information Systems – TUCBS project (Atac et al., 2020; Saralıoglu et al., 2019). As qualified human resources and their training/education are of great importance for the successful implementation and sustainability of TUCBS, the number of GIS education/training programs and courses and efforts to develop GIS-related vocational standards have increased. Tastan (2021) emphasizes the GIS lessons launched under the geography program of Istanbul University in the 1990s. On the other hand, GIS lessons and software were already taught under the landscape architecture program of Ankara University in the mid-1990s. Today, besides certificate programs provided by private and public initiatives, associate degree and graduate programs are delivered by various Turkish universities. Currently, 11 higher education institutions have 12 GIS associate degree programs. Diversity of geography, planning, landscape architecture, engineering, and surveying undergraduate programs also serve GIS courses. More than 15 higher educations in the country have active GIS-related master and doctorate programs.

While individuals with varying GIS knowledge and competency levels have been raised, Turkish National Vocational Qualifications Agency (MYK) has published 3 GIS-related vocational standards and national qualifications in the meanwhile, which were also shared by the higher education institutions, the private sector, and the relevant authorities as a guide to align their related educational/training programs. GIS-related national qualifications have also been critical basepoints to meet the human resources in the field as defined in the National GIS Strategy and Action Plan and the Türkiye Integrated Geographical Information Framework developed under the coordination of the Ministry of Environment, Urbanization, and Climate Change (CBS Genel Mudurlugu, 2020). Regarding the Geographic Data License Directive (Cografi Veri Lisans Yonetmeligi 2021), license applicants are required to employ GIS Specialists and/or GIS Operators (relevant national qualification certificate holders) recognized by the authorized national personnel certification authorities. This employment and certification process is primarily based on national qualifications. However, the recent revision made in March 2023 in the Directive allows the employment of graduates of GIS programs under some license application categories.

From this perspective, the relation between the outcomes of GIS education/training programs and GIS vocational standards/qualifications becomes even more significant as they are also the descriptors of the minimum requirements of knowledge, skills, and competencies for the target jobs and the assets for employment. This study aims to reflect and evaluate the perceptions of the graduates of GIS programs regarding the competencies gained throughout their education and the qualifications defined in the GIS Specialist (Level 6) National Qualification. A survey based on the learning outputs in the national qualifications was prepared,

and the participants were asked to evaluate to what degree they gained these outputs on a 5-point Likert scale. The results are expected to be used by the parties involved in both the national policymakers and the education sector.

Table 1. Centre the caption above the table

A1 - Workplace Health and Safety, Environmental Protection Measures, Quality Management Systems, and Work Organization
1. I can explain the risk factors related to workplace health and safety.
2. I can explain the requirements for reducing the risk factors related to workplace health and safety.
3. I can define workplace health and safety measures in the work area.
4. I can define emergency procedures in case of danger.
5. I can describe the environmental impacts of the work and the working environment.
6. I can identify potential hazards related to the work and the working environment.
7. I can define environmental protection measures related to environmental impacts and hazards that may occur during the implementation of working processes.
8. I can explain the basic requirements for the efficient use of resources such as energy, consumables, and time related to the work.
9. I can explain the quality requirements of the work.
10. I can explain the technical procedures for ensuring the quality of work.
11. I can explain the measures aimed at preventing/correcting the errors and malfunctions detected in the processes.
12. I can explain the requirements to prepare a work program according to the demands.
13. I can define the necessary procedures for work planning related to the work.
14. I can explain the requirements for personnel planning related to the work.
15. I can explain the procedures necessary to determine the characteristics of the work area.
16. I can explain the issues related to the arrangement of the work area.
17. I can define situations and requirements for communication with other professionals for duties outside my responsibility.
A2 - Information Security
1. I can list the main items related to information security standards.
2. I can define the confidentiality process within the scope of information security standards.
3. I can define the integrity process within the scope of information security standards.
4. I can define the accessibility process within the scope of information security standards.
5. I can list the main issues to be included in the security policy.
6. I can list the necessary actions to approve and enforce the security policy.
7. I can explain how the security policy will ensure its functionality.
A3 - Technical Organization
1. I can interpret the requirements for preparing the hardware and network configuration required for the GIS project.
2. I can interpret the requirements for preparing the software configuration required for the GIS project.
3. I can interpret the processes necessary to ensure data provision.
4. I can explain the requirements to ensure data organization.
5. I can interpret the processes necessary to identify methods to transform data into useful information.
6. I can list the processes required to query and analyze data.
7. I can explain national and international standards and legislation related to GIS.
8. I can explain the technical requirements and process for reporting.
9. I can describe the technical requirements and process for presenting data and information.
10. I can implement the requirements for preparing the software configuration required for the GIS project.
11. I can apply the requirements for preparing the hardware and network configuration required for the GIS project.
12. I can provide data.
13. I can arrange data.
14. I can identify methods that transform data into useful information.
15. I can query data.
16. I can analyze data.
17. I can prepare web services.
18. I can conduct reporting process.
19. I can conduct data and information presentation processes.

Materials and Methods

Material

The main material of this study is an online survey developed from the learning outcomes and the success criteria defined in the three qualification units of GIS Specialist (Level 6) National Qualification (16UY0255-6). The survey was prepared under four main sections, including the personal and demographic information of the participants and GIS competency levels for different qualification units. GIS Specialist (Level 6) National Qualification is structured under three qualifications units, namely,

- A1-Workplace Health and Safety, Environmental Protection Measures, Quality Management Systems and Work Organization,
- A2-Information Security, and
- A3-Technical Organization.

Within the national qualification system framework, all national qualifications, actively 648 in force varying between levels 2 to 6, include the A1 unit addressing workplace health and safety, environmental protection, and quality management requirements related to the vocation. Table 1 gives the survey questions addressing the qualification unit-based gains.

Method

Development and Implementation of Survey

The learning outputs defined under A1, A2, and A3 qualification units of GIS Specialist (Level 6) National Qualification were examined and reorganized to develop survey questions addressing only one gain at a time, so 38 criteria under the units were expanded to 43 questions and designed to provide evaluations on a 5-point Likert scale basis, where 5 refers to the highest level of gain and 1 the least. The online survey (Google Survey Form) was shared with the graduates of the GIS-related certificate program, associate degree, master's degree (with thesis, without thesis, without thesis-distance education), and doctorate degree programs run by Anadolu University and Eskisehir Technical University. The respondents were asked to make a self-evaluation to reflect their perceptions on to what degree they have gained the given criteria throughout their academic study.

The primary motivation for selecting the respondents from Anadolu University and Eskisehir Technical University is the shared history of both institutions in the field of GIS education. Before the establishment of Eskisehir Technical University by the legal detachment of the related faculties from Anadolu University in 2018, all the GIS-related programs were under Anadolu University. As of May 2018, GIS graduate programs were transferred to Eskisehir Technical University. Therefore, the graduates of these universities were more accessible than other programs conducted under different higher education institutions in the country.

Evaluation of Survey Results

The research was designed as a quantitative research method to compare the differences between the perceptions of the graduates of GIS certificate, associate degree, master, and doctorate programs regarding the level of achievement of the outcomes described in the GIS Specialist (Level 6) qualification units, throughout their academic education. Accordingly, the survey model was used to show whether there are any differences between the GIS-based programs and GIS Specialist (Level 6) National Qualification with the basis of ANOVA via survey modeling.

The survey model is the most widely used descriptive method in educational research, where researchers summarize characteristics (skills, preferences, attitudes, etc.) of individuals, groups, or the physical environment (such as schools) (Fraenkel et al., 20212). Normality assumptions regarding the usability of parametric tests were met in the data set created from different universities (Anadolu University and Eskisehir Technical University) ($p>.05$). In the analysis phase, one-way analysis of variance (ANOVA) was used from descriptive statistics and from parametric tests to determine the differences between the independent variable of GIS National Qualification and program profiles.

Results and Discussion

Survey Participation and Descriptive Statistics

This section analyzes the graduates' assessments of their own GIS skill sets after completing their respective degree programs. Accordingly, the descriptive statistics obtained within the scope of the participants' perceptions of GIS Specialist (Level 6) National Qualification Units (A1, A2, A3) are shown in Table 2. The data from the survey are almost symmetrical according to the skewness and kurtosis values.

Table 2. Descriptive statistics

	n	Minimum	Maximum	M	sd	Skewness	Kurtosis
A1	174	44,00	85,00	69,67	9,89	-0,159	-0,391
A2	174	13,00	35,00	25,82	5,59	-0,310	-0,199
A3	174	43,00	95,00	78,94	11,59	-0,375	-0,282
ALL	174	5,00	25,00	18,01	4,85	-0,380	-0,359

Although the online survey was shared with over 800 graduates of GIS certificate, associate degree, master's degree (with thesis, without thesis, without thesis-distance education) programs and doctorate programs of Anadolu University and Eskisehir Technical University, only 174 people completed it thoroughly. When broken down by degree level, the results showed that 39.1% (f=68) of the respondents obtained an associate degree, 3.3% (f=4) a certificate, 23% (f=40) a master's degree with thesis, 4% (f=7) a master's degree without thesis, 34.7% (f=43) a master's degree without thesis (distance learning) and 6.9% (f=12) a doctorate.

According to Table 2, in all GIS program groups, the average declared competency level is 4.09 in A1, 3.69 in A2, and 4.15 in A3, on a 5-point Likert scale. The overall average, including 3 of the qualification units, in other words, the GIS Specialist (Level 6) National Qualification, is found to be 3.60. Figure 1 illustrates the distribution of the average results per qualification unit on GIS program basis.

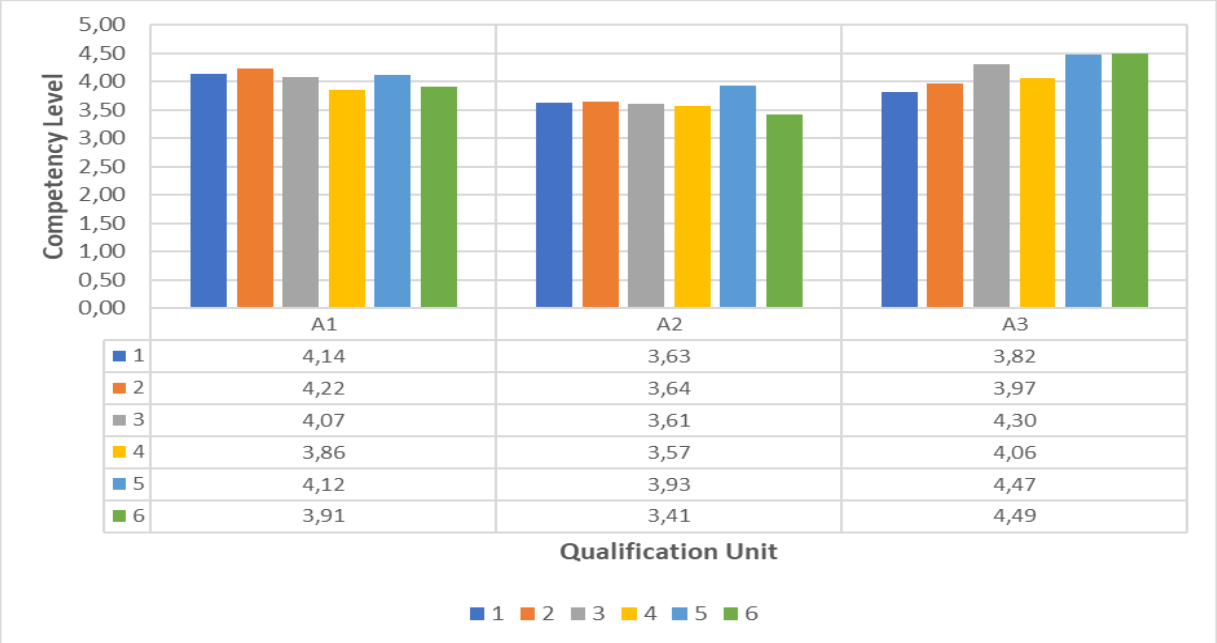

Figure 1. Survey result averages per qualification units

1: Associate degree, 2: Certificate program, 3: Master's degree (with thesis), 4: Master's degree (without thesis), 5: Master's degree (without thesis-distance education), 6: Doctorate degree

In this section, the results regarding the qualification unit-based perceived competency gains under 6 different GIS programs are presented, and the differences between the programs are compared to reveal whether there are significant differences based on the type of the completed program. Table 3-Table 5 summarizes the ANOVA results for each qualification unit according to GIS program types, while Table 6 presents results for all qualification units.

Table 3. ANOVA results for A1 qualification unit according to GIS program types

Prg. Type*	N	M	sd		Sum of Squares	df	Mean Square	F	Sig	Post hoc
1	68	70,43	9,95	*Between Groups*	295,037	5	59,007	0,596	0,70	-
2	4	71,75	6,95	*Within Groups*	16639,290	168	99,043			
3	40	69,30	9,97	*Total*	16934,328	173				
4	7	65,71	8,84							
5	43	70,14	9,97							
6	12	66,58	11,06							
Total	174	69,67	9,89							

**1: Associate degree, 2: Certificate program, 3: Master's degree (with thesis), 4: Master's degree (without thesis), 5: Master's degree (without thesis-distance education), 6: Doctorate degree*

Table 4. ANOVA results for A2 qualification unit according to GIS program types

Prg. Type*	N	M	sd		Sum of Squares	df	Mean Square	F	Sig	Post hoc
1	68	25,44	5,66	*Between Groups*	198,054	5	39,611	1,277	0,276	-
2	4	25,50	3,00	*Within Groups*	5210,061	168	31,012			
3	40	25,32	6,01	*Total*	5408,115	173				
4	7	25,00	5,45							
5	43	27,56	4,75							
6	12	23,92	6,73							
Total	174	25,82	5,59							

**1: Associate degree, 2: Certificate program, 3: Master's degree (with thesis), 4: Master's degree (without thesis), 5: Master's degree (without thesis-distance education), 6: Doctorate degree*

Table 5. ANOVA results for A3 qualification unit according to GIS program types

Prg. Type*	N	M	sd		Sum of Squares	df	Mean Square	F	Sig	Post hoc
1	68	72,71	11,38	*Between Groups*	5104,582	5	1020,916	9,456	0,000***	1-3 1-5
2	4	75,50	7,77	*Within Groups*	18138,843	168	107,969			1-6
3	40	81,77	10,40	*Total*	23243,425	173				
4	7	77,14	11,54							
5	43	84,98	9,15							
6	12	85,42	8,21							
Total	174	78,94	11,59							

**1: Associate degree, 2: Certificate program, 3: Master's degree (with thesis), 4: Master's degree (without thesis), 5: Master's degree (without thesis-distance education), 6: Doctorate degree*

Table 6. ANOVA results for all qualification units according to GIS program types

Prg. Type*	N	M	sd		Sum of Squares	df	Mean Square	F	Sig	Post hoc
1	68	15,25	4,59	*Between Groups*	976,720	5	195,344	10,596	0,000***	1-3 1-5
2	4	17,25	2,06	*Within Groups*	3097,257	168	18,436			1-6
3	40	19,10	3,74	*Total*	4073,977	173				
4	7	18,00	4,97							
5	43	20,95	4,29							
6	12	19,75	4,31							
Total	174	18,01	4,85							

**1: Associate degree, 2: Certificate program, 3: Master's degree (with thesis), 4: Master's degree (without thesis), 5: Master's degree (without thesis-distance education), 6: Doctorate degree*

The results summarized in Tables 3-6 demonstrate a significant difference between perceived qualification unit-based gains and graduated program types regarding A3 and GIS_TOP dimensions ($p<0.001$). LSD test was applied to address the program type significantly affecting the difference in A3 and GIS_TOP dimensions. LSD test results showed a significant difference between associate degree, master's degree with thesis, master's degree without thesis (distance education), and doctorate programs against associate degree. Although LSD test results show that there is a difference between doctorate degree and master's degree without thesis (distance education) programs at the A2 level, it is not significant.

Discussions

As previously explained in the relevant section, the survey results indicate a significant difference between the academic programs in the A3 unit. The A3 qualification unit includes foundational GIS knowledge and skills that form the basis of the education and training curriculum in academic programs and are focused on the acquisition of the primary program outcomes. Among these, as can be seen in Table 1, there are competencies such as collecting, processing, querying, analyzing, interpreting, and reporting spatial data, as well as skills related to the integration of relevant hardware and software infrastructure, understanding, and using the GIS standards, legislation, and web services. Besides, most knowledge and skills given in the A3 unit of GIS Specialist (Level 6) National Qualification are already adopted as major program outcomes in all the ongoing GIS academic programs and the certificate program included in this survey.

Based on the findings of the ANOVA test, it can be concluded that the competency level in the A3 unit increases in parallel to the level of education, as seen in the significant difference between the groups (associate degree program and master's and doctoral programs/ 1-3, 1-5, and 1-6). However, there is little distinction between master's and doctoral degrees in terms of perceived competency gain. The results obtained in A1 and A2 units show no program-related increase or decrease in the assessment of the gains. The A2 unit was found to have included the skills and knowledge that were rated as the least acquired among the 3 qualification units. The average rating of all groups in A2 is approximately 3.69, 4.05 in A1, and 4.15 in A3. According to the measurement/evaluation methods and criteria given in the GIS Specialist (Level 6) National Qualification, the success criteria of the exams are 60 in A1, 60 in A2, and 70 and 80 in the A3 unit, which is carried out in two stages, respectively. Based on a simple calculation, it can be concluded that all the survey participants consider themselves competent in meeting the basic requirements to obtain the GIS Specialist (Level 6) qualification certificate.

Conclusion and Recommendations

This study aimed at the determination of the competency gain levels of graduates of different GIS education/training programs in relation to the knowledge and skills put forward by Gıs Specialist (Level 6) National Qualification. 174 participants from certificate, associate degree, master’s degree, and doctorate degree programs of Anadolu University and Eskisehir Technical University completed the online survey and reflected their self-assessment on a 5-scale Likert Scale.

This survey is based on self-assessment. In other words, each participant rated the questions from their point of view and thus declared their competency level for the addressed knowledge/skill. The results indicate that regardless of the GIS program they completed, the respondents find their competency level achieved throughout their academic education compatible with the minimum requirements explained in the GIS Specialist (Level 6). The most surprising aspect of these results is that the knowledge and skills in A1 and A2 units, which the participants consider themselves to be highly competent, are not actually included in the program outcomes of the GIS programs included in this survey.

From these perspectives, first, the motivation and the factors encouraging the participants to believe that they have a high level of knowledge and skills that they have not learned within the scope of the program they graduated from should be investigated. Secondly, the reasons for the insignificant difference between the master's and doctorate graduates in the A3 unit should be analyzed. Finally, it should be examined whether there is a significant relationship between the actual competency achievement level of the candidates participating in the GIS Specialist (Level 6) certification exam and their GIS education background so that the consistency between the perceptions and the actual values should be revealed.

The results should be further studied as the degrees gained from relevant GIS programs are considered equivalent to the GIS Specialist (Level 6) Certificate under Geographic Data License Directive, which is a significant basis for GIs personnel employment.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Educathon 23 – Girls in Science: An Educational Experience for Teaching Technology with a Gender Perspective

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Abstract: Hackathons are events and work sessions derived from the technological field in which the participants work collaboratively around different challenges and, in a short period of time, seek innovative solutions, presenting them formally at the end of the session. Given the potential of this type of activity related to promoting the development of skills such as problem-solving, teamworking and creativity, among others, and with previous experience and success of its application in science educational contexts, we decided to apply it in the event of the International Day of Women and Girls in Science. Considering the significant concerns in the access of girls to science and technology professional areas, mainly due to gender stereotypes and biased as well as the lack of referents, we held the Educathon 23 - Girls in Science (www.educathonencic.com), aiming to promote equity access to science and technological education. Hence, working collaboratively in multidisciplinary teams, the 15 participants (students mainly from educational degrees) designed an educational resource aligned with the game-based learning methodology and addressed technology content, making the role of female researchers at the University of Málaga who work on related topics visible. To do so, they worked in groups of three during two sessions (five hours each) on the assigned tech topic and selected the stage (Early with a final five-minute presentation of each group. To analyse the experience, at the end of it, the participants responded to a questionnaire in which they generally expressed their satisfaction with the experience, how it had made them aware of the importance of making visible female references in their future teaching practice, and how it had provided them with examples of how to accomplish it.

Keywords: Technology education, Gender issues, Educational resources

Introduction

During the year 2013, the General Assembly approved the resolution on science, technology and innovation for development, in which it recognized that full and equal access and participation in science, technology and innovation for women and girls of all ages were essential to achieving gender equality and the empowerment of women and girls. Thus, the General Assembly declared February 11 as the International Day of Women and Girls in Science, in recognition of the key role played by women in the scientific and technological community. Under these premises, and knowing the importance of developing actions from the field of education that promote the access of women and girls to scientific education, the *Educathon 23 – Girls in Science* arises, a space designed for the creation of didactic proposals, that contribute to gender equity and equality in access to scientific education and make visible the role of women in science.

Gender-related Problems in Science and Technological Education

There is widespread concern about the relatively small number of students, in general, and girls, in particular, who opt for science and technology as fields to develop their professional future (Holmegaardet al., 2012). In other words, there needs to be more representation of women in higher education and careers related to STEM areas (Science, Technology, Engineering and Mathematics). In this sense, a UNESCO report (2021) shows the surprising inequality between genders, revealing that only 35% of students in STEM careers are girls and only 28% of researchers worldwide are women. More specifically, in Spain, in 2021, with 56% representing women in university degree studies, the rate of these in Degrees such as Computer Science was only 13% (Ministerio de Educación y Formación Profesional [MEFP], 2021).

This situation is surprising since students commonly consider science and technology areas of great relevance and importance for society (Vázquez, 2012). Given this contradiction, certain factors must influence this biased choice in higher education. Differential psychology research has revealed that men and women can study science and technology similarly. For this reason, the low representation of women in higher education and the exercise of careers related to these areas must attend to other factors. In this sense, authors such as Archer et al. (2014) and Rossi and Barajas (2015) point to the lack of female references as one of the keys that could explain why girls do not opt for these disciplines, which can also generate economic and social consequences, among others. In this sense, the experts stress that to prosper sustainably, the countries' economies require not only a scientifically literate population but also a significant workforce of professionals in science, technology, engineering and mathematics, as has been demonstrated in the health crisis due to COVID-19. Also, since STEM careers often offer higher pay, this would open the door to a better socio-economic gender balance (Chachashvili Bolotin et al., 2016).

On the other hand, considering the comprehensive training of people, it is important to highlight what STEM areas can contribute to collective and personal development (Zouda, 2018). In other words, we must consider the discrimination that, for the purposes of personal fulfilment, the deprivation of their presence in the scientific-technological and mathematical areas entails for women. Ultimately, ignoring the underrepresentation of women in STEM fields has serious economic consequences and perpetuates gender inequality and social injustice.

Different publications show that exposure to inspirational role models is crucial to foster student engagement with STEM disciplines, with a significantly pronounced effect in women exposed to role models of the same gender (Lookwood, 2006). Consequently, the educational approach must adopt an adequate understanding of science and technology in order to be able to challenge the stereotypes that persist in the curricula and among the teaching community itself.

For this reason, it is necessary to work from scientific and technological education, providing scientific and technological female references as close and current as possible and promoting awareness in future teachers of this teaching approach so that students not only contemplate these areas as essential but as something they want to be a part of.

Hackathons as Innovative Strategies to Promote Equity Access to Science and Technological Education

Considering the educational framework stated, it is essential to find new ways to promote the gender perspective through innovative tools of a technological nature that allow the adoption of examples of good practices. These tools have to promote the management of tensions and dilemmas while promoting autonomy and community work, innovation and continuity in democratic decision-making processes through integrated thinking (Kienzler & Fontanesi, 2017).

This innovation, referring to learning and teaching methods, is frequently enhanced through networked collaborative learning in multidisciplinary environments. Under these premises, during the last two decades, the so-called hackathons have emerged, events adapted from the business world, focused on new technologies and used as a practical means to improve learning and motivation (Maaravi, 2018).

Hackathons are events derived from the technological field in which participants form work teams around different challenges and collaboratively seek innovative solutions, presenting them formally at the end of the session and evaluating their capacity in terms of suitability to the problem, design and innovation. In this way, innovative features are incorporated, such as team-level cooperation or product launches through condensed presentations (Suominen et al., 2018). Although its application in the field of education is still limited, with

some experiences applied in Higher Education (Islind & Norstrom, 2020; Kuznecova et al., 2020; Steglich et al., 2020). The basic principles of the hackathon, related to intensity, collaborative work or the approach to real-life projects, contextualized, can be successfully applied to other disciplines, such as the Science and Technological Education.

Goals

The general goal of the proposal was to make visible referents of STEM researchers through the creation of educational resources for Early Childhood, Primary or Secondary Education that linked the basic knowledge specified in the LOMLOE curriculum with the research carried out by women in the STEM fields at the UMA, using the work strategy of hackathons.

By doing so, we hypothesized that the participant students would become aware of the importance of adopting gender approaches in scientific-technological teaching, fostering the capacities of teamworking, problem-solving and decision-making skills, and promoting entrepreneurship and innovation in this way.

Method

Research Context: The Educathon 23 – Girls in Science

With the gather experienced we accumulated in the development of Educathon21 and Educathon 22 (García Ruiz et al., 2021), addressed to promote inquiry skills in pre-service science teachers through the design of inquiry activities aligned to the SDG (García Ruiz et al., 2022). We decided to extend its application to the International Day of Women and Girls in Science.

Sessions Development

The first and only edition to date was held in February 2023 on the occasion of the International Day of Women and Girls in Science. Students enrolled in the 2022/2023 academic year in any of the degrees, masters, or doctorates at the University of Malaga were summoned. The participant students worked in multidisciplinary cooperative groups on an assigned challenge linked to the knowledge and contents of the Spanish Education Curriculum. The work groups, which also received a training workshop on the *App Inventor* application, were mentored by a group of experts in Science Education, designing resources that made visible the role of reference researchers in STEM areas of the University of Malaga. These researchers attended the conferences to discuss and collaborate with the working groups, thus bringing the main findings of their lines of research closer. Finally, five innovative educational proposals were developed, aimed at the levels of Early Childhood Education and Primary Education, which made visible and brought the UMA female research references closer to the students of these cycles, thus contributing to the creation of resources for the promotion of STEM vocations and the reduction of the gender gap in access to these areas. The proposals were publicly presented and evaluated by a panel of experts in educational research with a gender perspective, awarding a first prize according to the criteria established in the call.

Participants

A total of fifteen students, from multidisciplinary Bs and Ms degrees such as Philosophy, Social Education, Environmental Science or Teacher Education, among others, participated in the edition of the Educathon 23 – Girls in Science. None of them had experience designing or practising game-based educational resources aimed to contribute to equity in science education. All fifteen participants worked collaboratively in groups of 3 people, contributing to the design of the educational proposal from their expertise.

Instruments

Regarding the monitoring and evaluation of the experience, participants fulfilled a questionnaire developed in Google Drive, which included the assessment of the soft skills developed and the awareness of the gender

perspective developed through the event as well as the valuation of the educational resources designed, altogether contemplating the emotional aspects of the whole process (García Ruiz et al., 2020).

The questionnaire (table 1), designed *ad hoc* for the occasion, was then divided into two parts. The first one, concerning the cognitive profile, was composed by eight items in a four-point Likert-type scale (1: poor, 2: average, 3: good, and 4: excellent). On the other hand, the second part, concerning the emotional profile, referred to the emotions associated with the stages experienced through the sessions, and include achievement (confidence, satisfaction, shame, and dissatisfaction) and epistemic emotions (interest, concentration, boredom, rejection, and insecurity), and the participants could choose more than one emotion per stage.

Table 1. Questionnaire of the Educathon 23 – Girls in Science

In which grade has Educathon 23 contributed to developing the following **soft skills**? Choose from 1 (poor) to 4 (excellent)
Teamworking
Problem-solving
Creativity
Communication
In which grade has Educathon 23 contributed to developing the gender perspective? Choose from 1 (poor) to 4 (excellent)
Raising awareness of the importance of addressing STEM education from a gender perspective
Importance of making women researchers visible
Knowledge of the role of women in research
Willingness to adopt measures to promote an approach with a gender perspective in STEM education
Indicate how you felt while carrying out each process (you can mark more than one emotion): boredom (BOR), concentration (CON), confidence (CNF), dissatisfaction (DIS), insecurity (INS), interest (INT), shame (SHA), rejection (REJ), and satisfaction (SAT)
Group formation
Challenge approaching
Workshop
Collaborative working
Mentoring
Female researcher deepening
Resources presentation
Awards granting

Data Collection and Analysis

Data were collected at the end of the last session through the online questionnaire described previously. We performed a descriptive study for the quantitative data, collecting the frequency of each value per item study using Jamovi software (version 2.3.21.0). For the emotions data analysis, we collected the frequencies of emotions and their percentage of representation per stage, providing in this way a whole picture of the emotions experienced by the participants.

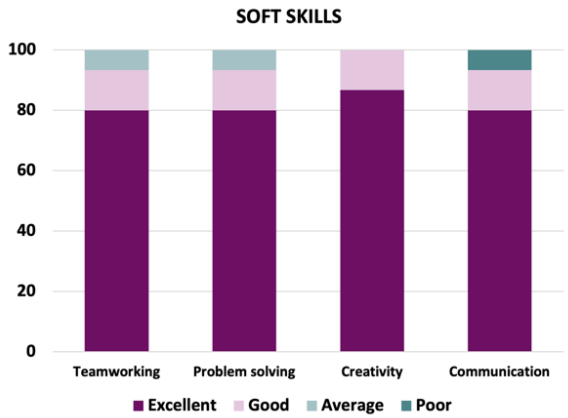

Figure 1. Frequency of results on the soft skills developed

Results and Discussion

About the Soft Skills Promoted by Educathon 23 – Girls in Science

The valuation of the soft skills developed through the Educathon 23 was quite positive, with 80% of participants considering it excellent in terms of team working, problem-solving or communication. The percentage is even more favourable regarding creativity, with the totality of participants expressing either excellent or good (Figure 1).

About the Gender Perspective Approached by Educathon 23 – Girls in Science

It is with great satisfaction that, regarding the gender perspective approached, circa 80% of participants considered that Educathon 23 – Girls in Science was excellent either for highlighting the importance of making women researchers visible, offering knowledge of the role of UMA women researchers, and creating the willingness to adopt measures to promote an approach with a gender-perspective in scientific-technological education. An even more significant percentage is considered in Educathon 23 – Girls in Science, helping to create awareness about the gender perspective (Figure 2).

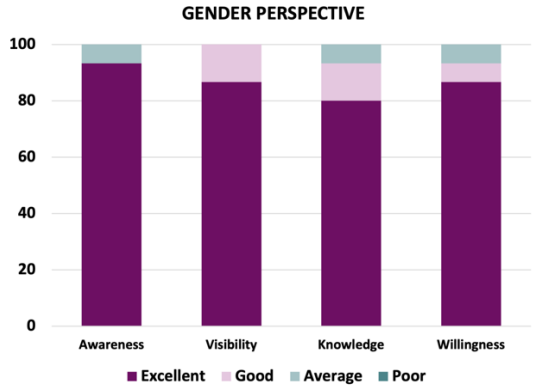

Figure 2. Frequency of results on the gender perspective approached

About the Emotional Profile Expressed during Educathon 23 – Girls in Science

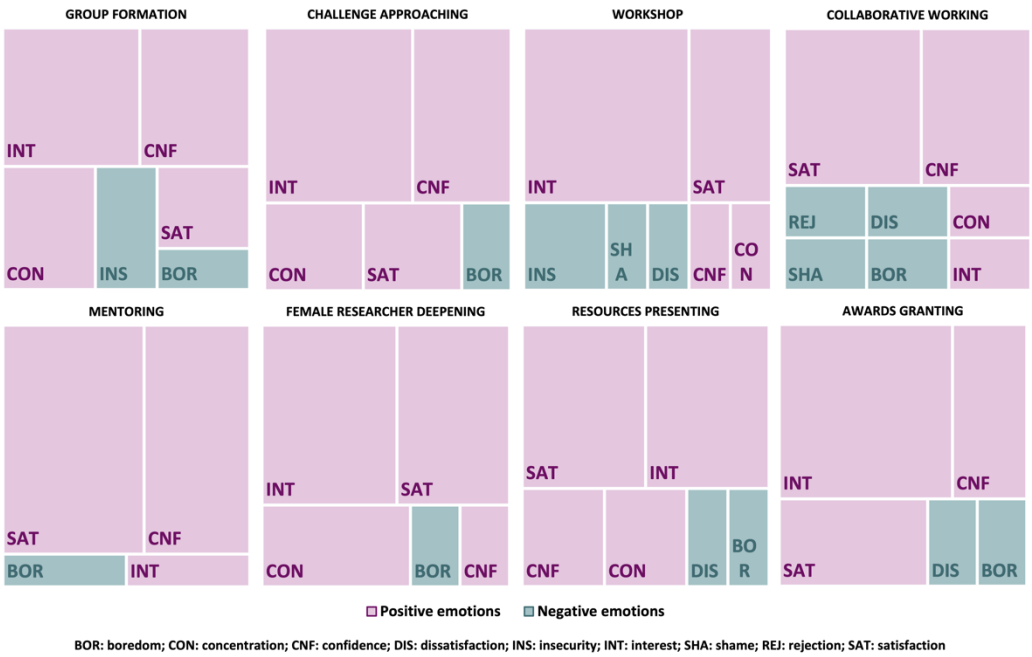

Figure 3. Emotional profile per stage of the Educathon 23 – Girls in Science

With reference to the emotional profile experienced during the Educathon 23 – Girls in Science, Figure 3 shows the emotions expressed by typology and step, observing how most of them are positive (up to 70% in each stage), being the most expressed "interest", followed by "satisfaction". It is worth mentioning that the stage of female researcher deepening and the presentation of the resources reached 94% of positive emotions. Negative emotions were represented in less than 22% in all the stages, but for mentoring stage, which reached 27%, being the most manifested "boredom", followed by "insecurity" (Figure 3).

Conclusion

Participants' assessment of the Educathon 23 – Girls in Science and their presentations were very satisfactory, finding them generally very interesting and related to the objectives set. Designing and presenting concrete examples of resources developed to approach the gender perspective since Early Childhood and Primary Education was highly valued, thus highlighting the importance of these kinds of exchanging scenarios and learning opportunities in students' formation. Thus, participants expressed an appropriate relationship between the development and the application of the contents addressed, with an emotional profile accompanying the results.

Recommendations

With the acceptable panorama revealed, and after revising the results of the assessment questionnaire completed by the participants and evaluating the organization's development, we consider as recommendations for subsequent editions to increase the number of days of the sessions, in similarity to other hackathons, also involving participants in the possibility of continuing with the optimization of their resources designed.

Scientific Ethics Declaration

The authors declare that the scientific, ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Analyzing the Documentary Film "Marie Curie" in terms of the Nature of Science Themes

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Abstract: In this study, it was aimed to examine the documentary film "Marie Curie" in terms of NOS themes. The study was designed with qualitative research method. In this study, the documentary film titled "Marie Curie", which was produced in Poland, Germany, France in 2016 and had a viewing time of 1 hour and 35 minutes, was used as a data source. Content analysis was used to analyse the scenes in the documentary. As a result of the research, it was determined that four themes of the nature of science were emphasised in the documentary: These are: Scientific knowledge is influenced by the social and cultural environment during the development and transformation of scientific knowledge into practice, scientific knowledge can change, imagination and creativity have an important role in obtaining scientific knowledge, and scientific knowledge is subjective. As a result, this study has shown that there is a tool that can be used in teaching some NOS themes and concepts.

Keywords: Marie Curie, Documentary film, Nature of science, Content analysis

Introduction

In recent years, science has been defined based on the postmodern understanding of science, which is quite far from the positivist perspective. According to the postmodern understanding, science is a subjective human endeavor based on theory and culture, and experimental observations (Schwartz, 2004). It is stated that the elements that make up science are knowledge, scientific process skills and the nature of science (Demirbaş, 2016).

Being scientifically literate individuals is very important for societies in solving the economic, social and environmental problems of the twenty-first century in which the products of science and technology are rapidly involved in our lives (Eisenhar et al., 1996). Scientific literacy means that individuals can participate in an informed decision-making process involving issues related to daily life (DeBoer, 1991). Understanding the nature of science is seen as an important component of scientific literacy (Lederman, 2007).

The nature of science brings together fields of study such as history, sociology, psychology and philosophy of science and seeks answers to questions such as "what is science, how does it work, how do scientists work, what is the impact of social and cultural contexts on science?" (McComas & Olson, 2000).

When the literature is examined, different definitions of science and NOS are encountered due to the multifaceted, complex and dynamic nature of science. For this reason, there is no consensus among philosophers of science, historians of science and science educators regarding the understanding of NOS (Demirbaş, 2016). However, some researchers have reached a consensus on some features of NOS (Abd-El-Khalick et al., 1998; Lederman et al., 2002; Smith et al., 1997; Smith & Scharman, 1999). Scientists working on the nature of science have developed different methods for teaching the nature of science. These are: the changeable nature of science, scientific knowledge based on evidence obtained from experiments and observations, subjectivity of

scientific knowledge, creative nature of scientific knowledge, observations, inferences and theoretical topics in science, social and cultural structure of scientific knowledge, scientific theories and laws (Doğan et al., 2012).

These can be explained as follows:

- Scientific knowledge is changeable (Abd-El-Khalick, 2001; Lederman et al., 2002) because science is a continuous process that seeks to uncover truths. Scientists check, test and improve the knowledge they acquire through experiments, observations and other investigations. At the end of this process, scientists may obtain new knowledge or more accurate knowledge. For example, as a result of their research, scientists may find that a previously accepted theory is invalid or incomplete. In this case, scientists change the old theory or develop a new one. Knowledge is thus corrected or completed over time.
- Science is based on knowledge obtained through experimentation and observation. Experiments and observations are conducted to formulate a scientific hypothesis, and experiments and observations are used to verify the truth or falsity of the hypothesis.
- Science tries to be obtained in an objective and objective way. Subjectivity is tried to be avoided during the processes carried out in science. However, any research cannot be completely free of subjectivity, since it is people who actually conduct scientific research (Lederman, 2007).
- Creativity and imagination play an important role in the creation of scientific knowledge. Imagination enables scientists to use existing knowledge to formulate new and unpredictable hypotheses and conduct research. When new hypotheses are formulated, they need to be verified by experiments or observations. However, imagination is needed to develop new ideas and formulate new hypotheses.
- Observation and inference are two basic methods used in science. Observation is a method used to conduct experiments, observe events and phenomena and collect data. Inference is the process of obtaining meaningful results after analyzing the data obtained (Lederman, 2007).
- The social and cultural environment has an impact on the development of scientific knowledge and its transformation into practice. Science is done according to the needs and interests of society, and the place of scientists in society, their access to knowledge and the opportunities to conduct research depend on their cultural and social environment.
- Laws and theories are different scientific knowledge. While laws are generalizations about observed natural phenomena, theories are explanations of these generalizations (Abd-ElKhalick et al., 1998). Theories and laws are different scientific knowledge.

When the literature on science and the nature of science is examined, it is seen that there are different perspectives on what scientific knowledge is, how scientific knowledge is constructed and how science should be taught (Köseoğlu et al., 2008). In recent years, three approaches to teaching have been put forward: historical, indirect and open-thinking approaches (Abd-El-Khalick & Lederman, 2000; Khishfe & Abd-ElKhalick, 2002; Irwin, 2000). The historical approach examines the development of science and its production processes (Demirbas, 2013). This enables students to learn the history of science and empathize with scientists; to realize the humanistic dimension of science, that scientific processes do not only consist of experimental results, that the development of science does not always proceed in a linear line and that fluctuations occur in history (Demirbas, 2013). This approach also enables students to explore the development of scientific theories in the social and cultural context of the relevant historical period (Gooday et al., 2008; Koseoglu et al., 2008; Mathews, 1994). According to Irwin (2000), events in the history of science reveal the importance of scientific knowledge. Therefore, explaining the history of science to students can arouse curiosity and excitement in them and help them comprehend the nature of science. In this approach, in order for students to learn about the nature of science, discussions about how scientists do science under which conditions are brought into the classroom environment. In the indirect approach, it is argued that when students participate in scientific activities such as inquiry-research or science process skills-oriented teaching, their understanding of the nature of science will progress spontaneously (Abd-El-Khalick, 2002; Lawson, 1982; McComas et al., 2002; McComas, 1993; McComas, 1998; Moss et al., 1998). Which of these approaches can be more effective in teaching NOS is one of the issues that science educators are still debating.

In the modern age we live in, animated movies are one of the most important visual and auditory educational elements used in the field of education (Kurtdas, 2021). Films reflect the social and cultural conditions of the period in which they were produced and the current situation they are in (Turan, 2022). There are some points to be considered in the process of using films, which started to be used for educational purposes shortly after the invention of the film camera (Kurtdas, 2021), for educational purposes. These are factors such as the subject of the movie, the choice of actors, and the quality of the message given in the movies (Kurtdas, 2021). As a result of the studies, it was concluded that movies are a "powerful educational tool" and that watching a movie even once causes measurable attitude change (Kurtdas, 2021).

Recently, various researches and experiments have been intensifying on the use of popular movies and TV series, which are not prepared for courses but appeal to the general audience, as an educational material in education (Bascı, 2020; Demmit, 1998; Gladding, 1994; McCullick et al., 2003; Nadir, 2013; Navakanesh et al., 2019; Yıldırım et al., 2015). Although the use of films as educational tools is not a common situation, it can be said that some film genres are more prioritized for educational purposes. Among these genres, documentaries, propaganda films and cartoons come first (Kurtdas, 2021). Documentaries are among the most effective genres that can be used for educational purposes because they carry more message concerns and formatting purposes than other types of films (Kurtdaş, 2021). One of the most important reasons why movies and especially documentaries are effective is that new generations are very familiar with visual media (Alvarez et al., 2004). However, students encounter many abstract concepts in different courses that are far from visualization. This makes it difficult for students to concretize abstract concepts (Taber, 2002). One of these courses is science. Documentaries, which are an effective type of movies, can be used in teaching abstract concepts in this course. In the literature, there are studies on films and film genres in the field of science education (Baskalyoncu, 2017; Dark, 2005; Efthimiou & Llewellyn, 2006, 2007; Piliouras et al., 2011; Kapucu et al., 2015).

In our developing world, it can be said that quality movies will be an important informal teaching tool in providing a conscious perspective on science. For this reason, it is necessary to increase the number of studies on TV series, documentaries and feature films that contain topics related to science, which is a part of our daily lives (Yılmaz, 2018). In this study, it was aimed to analyze the documentary film "Marie Curie" in terms of NOS themes.

Method

Research Design

The study was designed with qualitative research method and document analysis was used. Document review is defined as the process of obtaining, reviewing, questioning and analysing various documents that are described as sources in the research (Ozkan, 2021). Document analysis is a systematic process used to analyse printed or electronic materials (Bowen, 2009). Electronic materials such as films, videos and photographs can also be used in qualitative research (Merriam, 2009). In this study, films were used as document type.

Data Sources

The documentary film titled "Marie Curie", which was used as a data source in this study, was produced in Poland, Germany, France in 2016 and the duration of the film was 1 hour and 35 minutes. The director of the movie was Marie Noelle and the screenwriter was Marie Noelle. The movie is about the life of Marie Curie, the first and only scientist to be awarded the Nobel Prize in two different fields. In the movie, the concepts of thorium, radium, radiation, radioactivity, Nobel Prize, helium, lead, electromagnetism, uranium are mentioned.

Figure1. An image related to the movie Marie Curie (Pokromski & Noelle, 2016)

Data Analysis

Document review was carried out in five stages: accessing the documents, checking their authenticity, understanding the documents, analyzing the data and using the data (Forster, 2006). When documents constitute the entire data set of a research, it is stated that it is necessary to subject the documents to content analysis in line with the purpose of the research (Simsek & Yıldırım, 2021). Therefore, content analysis was used to analyze the documents.

Results and Discussion

The film Marie Curie was analyzed in terms of the themes of the nature of science (scientific knowledge is influenced by the social and cultural environment during its development and transformation into practice, scientific knowledge can change, imagination and creativity have an important role in obtaining scientific knowledge, scientific knowledge is subjective). This information obtained from the analysis results is presented in this section (Table 1).

Table 1. Analysis of the movie Marie Curie in terms of the themes of the nature of science

Nature of Science Theme	Time	Content	Description
Scientific knowledge is influenced by the social and cultural environment.	3.15-3.23	- Can horses win Nobel prizes? - No, only men can get it. Your mother is an exception. She's the first lady to win the Nobel Prize. - Then I'll be the second me. - Sure, why not?	The fact that the Nobel Prize was awarded only to men and Marie Curie was an exception shows that scientific knowledge is clearly influenced by the social and cultural environment.
	22.15-22.25	- You can do it in Poland. - What future will my daughters have in Poland? - What are you talking about? Poland is at the beginning of big changes. Your girls will be better off there than in a country that has never given Dreyfus his rights.	In this scene, Marie Curie thinks that her children will not have a good future in Poland, a newly independent country. This situation can be shown as an example that science is under the influence of social and cultural environment.
	30.03-30.14	- Does Madame Curie also teach at the Sorbonne? - Radium may be the latest fashion, but a woman professor will never be.	Here, it is emphasized that Mrs. Curie should not have been a professor at the university just because she was a woman, no matter how important her achievements were. From this point of view, we see that social and cultural elements affect scientific knowledge.
	01.06.00 01.06.12	- You can learn to convince them. - Back to reality. They won't admit a dirty Pole to the French academy. - You have done much more for France than those so-called patriots. - All this political intrigue behind the scenes...	Here we see Mrs. Curie complaining that she would not be accepted into the French academy just because she was Polish. Based on this complaint, we see that scientific knowledge is influenced by cultural and social elements.

	01.16.10 01.16.25	- We all know very well that Madame Curie could not have achieved these results on her own. - No woman could have done it. - This woman is a visionary!	It is stated here that Madame Curie is a woman and cannot come to a conclusion alone. And it is stated that no woman can do this either. As seen here, scientific knowledge is under the influence of social and cultural environment.
	01.15.09 01.15.25	- You think the French people don't want to know that the highest honor of the state is given to a woman who commits adultery? And she's Jewish. - Is he Jewish? As far as I know, he's not Jewish. If you want to fight, you have to offer a little more than his so-called Jewish origins.	Here we see that Marie Curie's private life was used and slandered to prevent her from receiving the Nobel Prize. From this point of view, we can say that the social and cultural environment is very important in the development of science.
	01.29.21 01.29.43	- We have prepared a statement announcing that you have voluntarily renounced the Nobel Prize, at least until this affair with Langevin blows over. It's the most elegant ending for everyone. - The award was given to me for my discovery of radium. A scientist's achievements have nothing to do with his private life. - The European press has been writing about your immorality for weeks. - Because I'm a woman. If you wanted to exclude every male scientist who had a secret affair, you couldn't find anyone to give the Nobel Prize to.	Here they are not interested in Madame Curie's discoveries, they are saying that she could not have won the Nobel Prize because of what happened in her private life. And they do this only because she was a woman.
	30.36- 31.03	- I don't like today's education system at all. Children should have time for sports to develop artistic sensitivity and you know well that nothing stimulates curiosity more than experimentation. But no! They force them into rote memorization, hopeless tricks. And they forbid girls to attend any physics classes. even if they're as gifted as Irene. - And you're going to find a cure for all this? - Yes, if necessary.	In this scene there is a plea to today's education system.
Scientific knowledge can change.	04.38- 04.53	- After Henry Becquerel had discovered the special light-emitting properties of uranium, Mrs. Curie proved that thorium and its constituents had the same properties and called these substances radioactive.	Here, after Henry Becquerel's discoveries, Ms. Curie added her own observations and reached a new substance. In other words, scientific knowledge changes and develops.
	02.14- 02.30	- As you can see, Thorium does not emit significant amounts of radiation. The emission of a particular element following a pattern of trajectories can vary.	While thorium has so far shown no significant amount of radiation, this could change with the emission of a specific element. So we see that scientific knowledge is subject to change.
	36.03- 36.21	- As Pierre Curie explained in his last lecture, the progress made in physics in the last 10 years has turned our perception of electromagnetism or matter upside down. As	The progress made in the field of physics in the last 10 years has changed the known knowledge. From this point of

		for the new discoveries in the chemistry of radioactive matter, we can only guess.	view, we see that scientific knowledge is changing every day in ways that we cannot predict.
Scientific knowledge is open to the influence of imagination and creativity.	09.29-09.56	- Our radium. It glows from within. - A healing agent in a state of inner turmoil. Either there's a demon inside or the atom is indivisible! - That would contradict all known theories.	Mrs. Curie said that the element radium radiates from within and that it is a healing substance. This shows that imagination and creativity play an important role in achieving scientific knowledge.
	43.10-43.35	- Are you asking me how new ideas are born? - Yes. - It's a very exciting question, but the answer is far beyond the limits of physics. As with everything else, you have to rely on your intuition and common sense. Many scientific discoveries are a mixture of talent and coincidence.	Here, it is necessary to rely on common sense and intuition in the formation of new ideas Creativity is necessary in the development of new ideas.
Scientific knowledge is subjective.	05.24-05.40	- Check it out! The Times doubts that radium is an element. - Quiet! Radium is not a combination of helium and lead, as our distinguished colleagues claim. Mrs. Curie and I believe the new discovery will do more good than harm.	While the Times doubted that radium was an element, Mr. and Mrs. Curie believed that radium could be useful in many ways. This shows that the same physical phenomena can be subjectively explained in different ways by different scientists.

When analysed in terms of the themes of the nature of science in the film, it is mostly seen that scientific knowledge is influenced by the social and cultural environment during the development and transformation of scientific knowledge into practice (8 scenes). This theme was followed by scenes related to the fact that scientific knowledge can change (3 scenes), that creativity is used in the process of obtaining scientific knowledge (2 scenes) and that it is subjective (1 scene). In the film, the nature of science theme that scientific knowledge is influenced by the social and cultural environment was predominantly emphasised.

Conclusion

As a result of the research, it was determined that five NOS themes were emphasised in the documentary: These are: Scientific knowledge is variable; it contains logical, mathematical and experimental inferences; it is subjective; it is open to the influence of imagination and creativity; and it is influenced by the social and cultural environment. In the film, emphasis on the nature of science theme that scientific knowledge is affected by the social and cultural environment was found. The reason for this is that in the film, how Marie Curie was affected by the taboos of the period in which she lived as a woman scientist and what she experienced due to these taboos were covered in detail. Marie Curie is a scientist working on radioactivity. For this reason, the film can be used in science education. In the literature, there are studies on the nature of science (Baskalyoncu, 2017; Kapucu et al., 2015). The results of these studies overlap with the findings of the current study. As a result, this study has shown that it is a tool that can be used in teaching some NOS themes and concepts. Therefore, the documentary film "Marie Curie" examined in this study can be used as a tool for teaching NOS themes at various grade levels and in science courses. Studies can be planned in this direction.

Recommendations

The documentary film "Marie Curie" examined in this study can be used as a tool for teaching NOS themes at various grade levels and in science courses. In addition, other films with scientific concepts can also be examined and studies on NOS and concept teaching can be planned.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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An Examination of Femicides Committed during the Divorce Process

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Abstract: With couples getting married and having children, individual, husband-wife, parent-child, and sibling subsystems are formed. If a couple cannot maintain their marriage and one of the parties desires divorce, it is necessary to dissolve the husband-wife subsystem that was formed through marriage to achieve a healthy divorce. This research addresses femicides that occur as a result of the failure to dissolve the husband-wife subsystem during the divorce process. For a detailed analysis of the situation, divorce and femicide-related news articles published between 2016 and 2020 were searched on the websites of three of the most widely read newspapers in Turkey. The research findings revealed that murders are committed in Turkey due to the unhealthy conduct of the divorce process. These murders occur mostly during the formal divorce process, and they increase in parallel with the rising number of divorces each year. Moreover, during the divorce process, it is observed that men exert continuous pressure on women. The mismanagement of the divorce process by couples and men's inability to accept separation can lead to fatal consequences. The findings of the research highlight the importance of mandatory counseling services during the divorce process. Social work professionals and policymakers who intervene at the micro, mezzo, and macro levels are recommended to develop policies that enforce mandatory counseling services for couples going through the divorce process.

Keywords: Divorce, Divorce process, Femicide, Counseling service

Introduction

Marriage creates a social institution with functions such as fulfilling individuals' needs for love and affection, sharing life's responsibilities, maintaining a regular sexual life, and ensuring the continuity of the family line. According to system theorists who define the family as a system, marriage establishes the husband-wife subsystem between spouses. After having children, this subsystem expands to include the individual subsystem, as well as the parent-child and sibling subsystems (Bartle & Selesnick, 2013).

In the literature, "divorce" is defined as the termination of the marriage contract by individuals due to reasons such as incompatibility, disagreement, infidelity, financial difficulties, and violence (Kucukkaragoz & Aktas Akoglu, 2018). After divorce, individuals are expected to dissolve the husband-wife subsystem that formed during the marriage in a healthy manner. However, in some cases, one or both of the divorced partners may struggle to sever their emotional ties with their ex-partner. They might contemplate getting back together, show continued interest, curiosity, or love, monitor developments in their ex-partner's life, interfere with the new relationships, try to have a say in their ex-partner's life, and exert pressure. This situation is referred to as "ex-spouse syndrome" (Kahn, 1990; Kahn, 2011). Ex-spouse syndrome can remain at an emotional level with feelings of interest, curiosity, or love towards the former spouse, or it can manifest in both physical and

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emotional dimensions by attempting to intervene in the ex-partner's life, influencing their decisions, and trying to exert control. This ongoing connection in both physical and emotional dimensions can make it difficult for both individuals to move on and build new lives. Continuing the physical and emotional aspects of ex-spouse syndrome can eventually lead to verbal harassment, violence, and even murder. All of these outcomes can be experienced throughout the divorce process. Research in the literature also shows evidence of verbal harassment, violence, and murder occurring during the divorce process (Fleury et al., 2000; Webster et al., 2003; Brownridge, 2006; Can & Aksu, 2016). Studies focused on ex-spouses indicate that such violent incidents are primarily perpetrated by men (Johnson et al., 2014). When the studies on femicides in Turkey are reviewed, it is seen that the desire for divorce or the act of divorce is among the leading reasons for these murders. In a study on 1260 femicide cases between 2008 and 2018, Yıldırım (2018) found that 348 cases were due to disputes, ranking first, while 176 cases were related to divorce requests or divorce itself, ranking second. In a study analyzing 121 newspaper articles on femicide, Seven and colleagues (2015) found that "divorce/wanting a divorce" was the leading cause in 35 cases. According to Can and Aksu (2016), women can be subjected to violence or even killed due to their desire for divorce. The information from the literature showing the relationship between divorce and violence/murder against women reveals the consequences of ex-spouse syndrome.

One of the most common risk situations for violence against women is related to separation and divorce processes. However, there have been few studies that specifically examine the extent or nature of violence during the divorce process (McMurray, 2009), and the available studies are in the international literature. According to Brownridge (2006), there are several factors during the divorce process that contribute to the risk. Dependency on their spouse is one of these factors, especially among men. Men who cannot accept the end of their relationship and fail to terminate it in a healthy way resort to violence.

Patriarchy, male peer support, and the post-separation phase are other risk factors within the macro system that contribute to violence during the divorce process. Men may perceive their partner's desire for divorce as a threat to their authority and struggle to accept the idea of divorce, leading them to resort to violence to maintain control over their spouse. Men who want to preserve their status within their peer group and fear losing their approval may also use violence against their spouse who wants a divorce. As time passes after the divorce, the likelihood of violence decreases proportionally. Most incidents of violence occur shortly after separation (Brownridge, 2006). The first instance of violence after separation typically occurs within 1-2 years. Although the risk of violence perpetrated by the former spouse decreases over time, it never completely disappears (Fleury et al., 2000).

In Turkey, the majority of research on divorce focuses on the reasons for divorce and the challenges experienced during the divorce process (Kucukkaragoz & Aktas, 2018), post-divorce experiences, the impact of divorce on children (Can & Aksu, 2016), and the theoretical structure of the divorce process (Korkut, 2003). However, when the research on femicides in the Turkish literature is reviewed, it is observed that divorce is merely mentioned as one of the reasons for femicides (Seven et al., 2015; Yıldırım, 2018). There seems to be a lack of in-depth studies investigating what causes femicides specifically during the divorce process.

This study aims to bridge the gap in the literature by examining femicide and divorce in conjunction and highlighting the importance of pre-divorce counseling measures to reduce femicides. Additionally, the study is significant as it not only statistically analyzes femicides during the divorce process but also evaluates these murders in the context of the ex-spouse syndrome, thus providing in-depth insights. The research findings can be utilized in the formulation of preventive policies against femicides. Social workers, who specialize in family matters and preventive services, are believed to play a crucial role in the development of such policies.

The study aims to explore the consequences of the ex-spouse syndrome resulting from the unhealthy termination of the husband-wife subsystem during the divorce process and its impact on the parent-child subsystem. It also aims to identify when and at which stages of the divorce process these femicides occur the most. To achieve this aim, news articles related to femicides/femicide attempts and divorces published in three of the most widely read newspapers in Turkey in 2016, 2017, 2018, 2019, and the first two months of 2020 were analyzed. The study investigates the relationship between the ex-spouse syndrome and femicides during the divorce process, the number of murders, locations and cities where these murders took place, and the outcomes of these crimes. Within this framework, the research seeks to answer the following questions regarding femicides committed during the divorce process: What are the statistical results (number of murdered women, number of murders by year, cities with the highest murder rates) related to femicides? At which stages of the divorce process (pre-divorce, during the divorce, post-divorce) are femicides most frequently committed? What are the factors contributing to femicides? During which years of marriage are femicides most commonly committed? What are

the educational backgrounds and occupations of those who commit femicides? Do children witness these crimes, and how are the murders committed? The terms used in the research represent different stages of the divorce process: pre-divorce refers to the initiation of divorce proceedings by one of the spouses, during the divorce represents the official divorce process, and post-divorce refers to the period after the official divorce is finalized. Divorce process encompasses all these stages, including filing a divorce petition, initiating a lawsuit, and ongoing court proceedings, formalizing the divorce.

Method

In this study, the document analysis model, which is one of the qualitative research methods, was used. Documents are among the secondary data sources in qualitative research. In the analysis of document data, three different approaches are employed namely description, analysis, and interpretation (Patton, 2015; Kumbetoglu, 2019). The "analysis" method was used in the analysis of document data in this research.

To collect data for the study, news articles published on the official websites of Sozcu, Hurriyet, and Milliyet newspapers between 2016 and 2020 (all 12 months of 2016, 2017, 2018, 2019, and the first 2 months of 2020) were searched using the keyword "divorce and femicide" in March 2020. The retrieved articles were categorized based on the pre-divorce, during the divorce, and post-divorce stages and were analyzed and interpreted through document analysis. The newspapers whose articles were examined were selected based on the list of the most read newspapers according to the newspaper circulation report on the Journalists' Association's official website. The articles from different newspapers were carefully examined for any duplications, and if the same article was found in multiple newspapers, it was only included in the findings of one newspaper while excluded from the findings of the other newspapers. Within this scope, a total of 113 news articles were analyzed.

The research data were collected in March 2020; thus, the newspaper articles of the first 2 months of 2020 were included in the analysis. After data collection, the analysis process was initiated. As the research was based on newspaper articles, the limitations of the study are the lack of desired information in the articles and conflicting statements about the same news in different newspapers. While some data were common in all newspaper articles, certain data were present in some articles but not in others. The common data were presented in tabular form in the findings section, while other data were presented in the form of thematic context. The non-common data in all articles are also considered as one limitation of the research. These include the number of years couples remained married, educational backgrounds, professions, and ages of both men and women. A document analysis form prepared before the research was utilized during the document analysis process. The questions included in this form are as follows:

1. At which stages of the divorce process were femicides/femicide attempts committed, and which stage witnessed the highest number of murders?
2. Is there an increase in femicides/femicide attempts over the years?
3. In which locations were femicides/femicide attempts committed?
4. In which city were femicides/femicide attempts most prevalent?
5. What are the factors contributing to femicides/femicide attempts?
6. How many years have the couples been married when the murders occurred or were attempted?
7. Do children witness the murder process?
8. What is the method of committing the murders?

Findings

In this section, findings related to news articles covering femicides during the divorce process and obtained from the archives of Sozcu, Hurriyet, and Milliyet newspapers between 2016 and 2020 are presented.

Table 1. Number of news articles according to the newspapers

Newspaper	Number of news articles	%
Sozcu	30	24.81
Hurriyet	64	48.12
Milliyet	39	29.32
Total	133	100

Table 1 presents the number of news articles obtained with the keyword "divorce and femicide" between 2016 and 2020 in Sozcu, Hurriyet, and Milliyet newspapers. According to the table, it is observed that Hürriyet newspaper published the highest number of news articles on divorce and femicides/femicide attempts, with 64 articles (48.12%).

Table 2. Number of news articles by year

Years	Number of news articles (n)	%
2020 (First 2 months)	4	%3.00
2019	58	%43,60
2018	37	%27,81
2017	27	%20.30
2016	7	%5.26
Total	133	%100

Table 2 shows that the news articles related to "divorce and femicide/femicide attempts" have been increasing each year. The most news regarding divorce and femicide or attempted femicide was recorded in 2019 (58 articles, 43.60%).

Table 3. Time of femicides/femicide attempts according to the divorce process

Divorce Process	Femicide/Femicide Attempt	
Pre-divorce	17	%12.78
During the divorce	108	%81.20
Post-divorce	8	%6.01

Table 3 displays the number of femicides/femicide attempts that occurred during each stage of the divorce process. Out of 133 femicides/femicide attempts, 17 (12.78%) took place before the divorce, 108 (81.20%) during the divorce process, and 8 (6.01%) occurred after the divorce. It is observed that the majority of femicides/femicide attempts occurred during the divorce process.

Table 4. Number of femicides/femicide attempts according to the cities where they occurred

City	Number of News Articles	%
Istanbul	45	%33.83
Adana	8	%6.01
Gaziantep	7	%5.26
Other cities	73	%54.88
Total	133	%100

According to Table 4, it has been determined that femicides/femicide attempts during the divorce process occurred at the highest rate in Istanbul with 45 news reports (33.83%), followed by Adana with 8 reports (6.01%), and Gaziantep with 7 reports (5.26%). Additionally, Sozcu newspaper covered other femicides related to divorce in various cities, including Konya (1), Bursa (1), Sanlıurfa (1), Malatya (1), Tekirdag (1), Nigde (1), Balıkesir (1), Igdır (1), Aydın (1), Kutahya (1), Hatay (1), Eskisehir (1), Izmir (2), Kocaeli (1), and Mersin (1). Hürriyet newspaper also reported other femicides related to divorce in different cities, including Erzurum (2), Sakarya (1), Bolu (1), Antalya (2), Bursa (5), Yozgat (1), Kütahya (1), Hatay (1), Afyon (1), Malatya (3), Konya (1), Ankara (2), Diyarbakır (2), Samsun (2), Mersin (2), Kayseri (3), Çanakkale (1), Kahramanmaras (1), Edirne (1), Kocaeli (3), Aydın (2), Denizli (1), Sivas (1), Mugla (1), İzmir (4), Aksaray (1), Mersin (3), Nigde (3), and Çorum (1). Furthermore, Milliyet newspaper covered other femicides related to divorce in various cities, including Trabzon (1), Elâzıg (1), Aydın (1), Kırklareli (1), Eskisehir (1), Samsun (3), İzmir (1), Aksaray (1), Antalya (2), Amasya (1), Konya (3), Ankara (2), Bolu (1), Kocaeli (1), Çorum (1), Manisa (2), Bursa (1), Kars (1), and Cankırı (1).

Table 5 shows that femicide/femicide attempt incidents during the divorce process occurred in four different locations: home, street, vehicle, and workplace. Among these, it was determined that femicide/femicide attempts most commonly occurred at home. Here, "home" represents the place where the woman used to live with her husband, the place where she started living separately from her husband, or her parental family's home. The concept of "street" includes 1 hospital, 3 parks, and 1 parking lot in addition to public streets. "Vehicle" represents taxis, cars, and automobiles. "Workplace" can be the place where the woman herself works, or it can be the workplace of her friend or her parental family. Through the examination of newspaper articles in the

research, various themes related to the reasons behind femicide during the divorce process have been identified, in addition to the numerical findings provided above.

Table 5. Location of femicide/femicide attempt during the divorce process

Location	Number of News Articles (n)	%
Home	60	%45.11
Street	49	%36.84
Vehicle	12	%9.02
Workplace	12	%9.02
Total	133	%100

Theme 1: Failure to Close the Husband-Wife Subsystem

Men are unable to accept divorce and exhibit behaviors such as persistent stalking, verbal and physical harassment, violence, placing listening devices in the home, threatening or attempting to kill the spouse and her relatives both in public places, workplace, and at home. Out of the 113 murders, 108 occurred during the official divorce process. Murders can happen immediately after the divorce case is filed or even after ongoing divorce proceedings that have been continuing for 2-3 years.

Some murders are planned as a result of stalking, while others occur after the husband goes to reconcile with his wife, but she refuses to reconcile, leading to an argument and eventually the murder. In their statements after the murder, men generally claim not to remember the moment of the crime. Their statements often include phrases like "She rejected my offer to reconcile.", “She insulted me.”, “I lost control.”, and “I can't remember what happened." Murders are not only directed at women who want a divorce but can also target a woman's family member, friend, or new partner if she has one during the divorce process. If the woman has a new partner, there is a high chance that he may also fall victim to the murder.

In some cases, the husband first kills his wife, then the children, and finally himself. During the murder, men are observed to lose control, and they do not just stab or shoot their wives once but multiple times. In rare cases, other methods such as strangling with a chain or burning with an iron are also used during the murder. After killing their spouse during the divorce process, men may also treat the deceased body in different ways. Even having a child together does not prevent these murders. Sometimes, the murder happens in front of the child. In one news report, a husband attempted to kill his wife in the hospital right after she gave birth to their third child during the divorce process, but the murder was prevented by the intervention of security.

In another case, a couple who were still married had been living separately and not communicating due to their incompatibility for many years. When the woman filed for divorce after 8 years of not seeing or living with her husband, he killed her. This theme demonstrates that in marriages, the husband-wife subsystem cannot be closed in a healthy manner.

Theme 2: Legal Inadequacies

Many women file multiple criminal complaints against their husbands who eventually kill them. They submit numerous petitions and obtain restraining orders. However, sometimes even the restraining order does not prove effective, as the husband finds a way to bypass it and commit the murder on the very day it expires. Women who have been victims of attempted murder often complain about the prolonged process of obtaining restraining orders and the fact that, despite having obtained such orders against their spouses during the divorce process, their husbands can still attempt to kill them.

In some cases, the involvement of neighbors during the attempted murder has saved the woman's life. However, in others, both the woman and the neighbor trying to protect her have been killed. Strikingly, in all these cases, the perpetrator received a sentence for the attempted murder, but that did not prevent him from making a second attempt and succeeding in killing his wife.

According to the news reports, before the murder, women often report verbal and physical harassment or violence by their husbands to the prosecution, expressing their fear of being killed by them. Reporting to the

prosecution can result in three outcomes: no punishment, obtaining a restraining order, or a lengthy legal process leading to a late issuance of the restraining order. In some cases, husbands who were arrested when the police arrived at the scene after domestic violence were later released following the investigation. The news reports show that despite women filing complaints with the prosecution, they are still killed. In one news report, it is observed that the woman had submitted a total of 53 petitions to the prosecutor's office about her husband before she died during the divorce process.

In the divorce process, the court may prolong the proceedings. In another case, during the divorce process, a father, who wanted to find out the whereabouts of his wife from his daughter, shot his daughter 38 times when she refused to disclose her mother's location. In this case, the woman had requested the court to finalize the divorce process and end the marriage after her husband had killed their daughters. However, the court required the presence of the husband for the divorce to be finalized, and therefore, they had to wait for his release or trial process. In another case, it is seen that a husband is on leave from prison and killed his wife, who was in the process of divorce.

Furthermore, during the review of newspaper articles, it was found that important data such as data on how long they were married at the time of the murder, the education level or occupation of the perpetrators, and the condition of children during the murder were not consistently present in the news, making it difficult to gather reliable information. Despite this limitation, the following findings were derived from the available data.

Theme 3: Duration of Marriage in Years

Another factor that does not seem to have a preventive effect on the murders is the number of years the couples have been married. Murders can occur during the divorce process regardless of whether the couple has been married for 3-4 years or for 20 or more years. Since the news articles do not specify the exact number of years the couples have been married, a definitive correlation between the number of years married and the occurrence of murders during the divorce process cannot be established.

Theme 4: Education/Occupation

Since not all news articles provide information about the profession of the men, a general interpretation regarding the relationship between their education level and committing the murders cannot be made. However, among the cases where the profession is mentioned, individuals with both low and high education levels and status, such as police officers and doctors, have been found to be perpetrators of murdering their wives during the divorce process. Similarly, since the news articles do not specify the profession of the murdered women, it is not possible to make any comments on how the woman's education level or profession posed a risk during the divorce process.

Theme 5: Children's Witnessing the Murder

According to newspaper articles, there are cases where the children of spouses going through the divorce process were present during the murder and witnessed the incident. These children are subsequently placed under the protection of the Ministry of Family and Social Services and are forced to continue their lives with the memory of witnessing the murder, the loss of their mother, and the fact that their father is a murderer. They have to carry this burden for the rest of their lives or continue their lives with the family of the father who committed the murder.

Theme 6: How the Murders are Committed

Another finding obtained from the analysis of newspaper articles is that these murders are committed in a brutal manner. Men brutally kill their spouses during the divorce process by shooting them multiple times with firearms, using sharp objects, strangling, burning, physically assaulting, and torturing them.

Discussion

In our country, the number of divorces has been increasing every year, especially in recent years, while the marriage rates have been declining (Şirin, 2013; Öksüzler Cabılar & Yılmaz, 2022; TÜİK, 2022). The essential question to be asked here is "how many couples can divorce in a healthy manner?" In other words, after the divorce, how many people can look at their ex-spouse as "someone I once shared my life with" or "the mother/father of my child," instead of displaying hostile attitudes? The answer to these questions is that individuals often fail to "properly close the husband-wife subsystem" during the divorce process. This inability not only prevents a healthy divorce but also leads to extreme consequences, including murder.

In this research, 133 news articles related to "divorce and femicide" in the most read national newspapers, Sozcu, Hurriyet, and Milliyet, between the years 2016-2019 and 2020 (first two months) were analyzed. According to the research findings, women are being killed in all stages of the divorce process: before the divorce when they want to get divorced, during the formal divorce process, and after the legal divorce. Moreover, the number of women killed during the divorce process is increasing each year, parallel to the rising divorce rates in Turkey, indicating a concerning trend of increasing homicides related to the divorce process.

When examined in terms of the divorce process, it is observed that most of the femicides/femicide attempts occur during the divorce stage, when the woman formalizes her desire for divorce. Literature reviews indicate that research on femicides considers all the reasons comprehensively to understand the underlying factors. Yegen's (2014) study, which evaluated femicides based on newspaper articles, identified 11 reasons for femicides, with jealousy and divorce being the top two. According to the study by Sallan Gul and Altındal (2015), there are seven reasons for femicides, and divorce ranks at the top with a significant rate of 83%. In the research conducted by Gunes and Yıldırım (2019), divorce is the leading reason with a rate of 28% among the ten reasons for femicides. Similarly, in the study by Seven et al. (2015), divorce or the desire for divorce ranks first among the nine reasons cited for femicides/femicide attempts. Webster et al. (2003) suggest that separation can be directly related to the woman being killed by her husband. When the findings in the literature and in this study are reviewed, it becomes apparent that men have difficulty accepting divorce. Instead of accepting divorce, some men choose to murder their spouses and face imprisonment. Although the role of divorce in femicides has been highlighted by researchers, there is a notable lack of in-depth studies investigating femicides and divorce within a shared context.

When we examine the number of femicides/femicide attempts committed during the stages of pre-divorce (17), during the divorce (108), and post-divorce (8), it is evident that the number of femicides during the divorce is significantly higher than the other two stages. The during the divorce stage includes official divorce process. The woman officially initiates the divorce, which poses a higher risk of femicides compared to the pre-divorce stage where the divorce is only mentioned as a request and the post-divorce stage when the divorce is finalized officially. The most critical period is when the woman formalizes the divorce request. In a news report, it was noted that a man murdered his wife after living separately for 8 years with no contact, when she filed for divorce. This indicates that living apart does not pose a problem for men, but when a woman seeks to formalize the separation through divorce, she becomes a victim of femicide.

As a result, men seem to be unwilling to accept divorce even if they live separately. In the literature, divorce has been identified as one of the reasons for female homicides, but as in our study, no detailed analysis focusing on female homicides during the divorce process has been found. The fact that a woman is killed simply for expressing her desire for divorce without even formalizing it (17) highlights the horrifyingly close relationship between divorce and femicides. According to Can and Aksu (2016), women can experience violence and, even worse, be killed solely for expressing their wish to divorce. Brownridge (2006) states that men may perceive their spouse's divorce request as a threat to their authority. They may struggle to accept the idea of divorce, resorting to violence to maintain control over their partner. It is believed that the reasons behind men's negative reactions towards divorce and their perception of it as a loss of authority are rooted in patriarchal values, which have been influential in numerous societal events.

It is observed that the highest number of femicides/femicide attempts occur in Istanbul. This finding is supported by the literature. According to the research conducted by Seven et al. (2015), which examined female homicides reported in newspaper articles, Istanbul is the city where female homicides are most frequently committed. Yıldırım's (2018) research evaluating femicides that occurred over the last decade also confirms that Istanbul is the city with the highest number of femicides. This is believed to be influenced by Istanbul's cosmopolitan structure, bringing together people from various cultures and different cities of Turkey, as well as being the most populous city in Turkey.

In some countries, there are programs designed to facilitate healthy communication and parenting relationships between former spouses after divorce. These practices teach couples how communication and parenting should be after divorce. Research data shows that when ex-spouses learn to communicate with respect, listen to each other, and value each other's words, they find it easier to overcome the post-divorce period and adapt more successfully to their new lives (Taylor, 2010). Individuals who let go of hostile feelings towards their ex-spouse and forgive them tend to have a more positive outlook on new partners after divorce (Cook et al., 2012). Moreover, letting go of negative feelings towards the ex-spouse accelerates the post-divorce emotional well-being (Rye et al., 2004). One of the most important techniques used to bring about change in any situation is reframing. An existing problem is redefined to change the family's perspective on the issue and provide a new meaning (Unal, 2013). In this study, it was observed that men's perspectives on divorce and their perceptions of divorce need to be reframed. At the very least, for the well-being and healthy development of children born from the marriage, they need to make joint parenting decisions and establish a healthy relationship and communication.

Another noteworthy finding from the analysis of newspaper articles is the brutal nature of these murders. Men, during the divorce process, commit extremely inhumane acts against their partners such as suffocation, shooting multiple times with a gun, dismemberment, and burning, which violate human dignity. This pattern is almost present in all cases. Very few women escape from being brutally murdered. This indicates that divorce creates a profound and seemingly insurmountable crisis between the couples. The concept of divorce causes men to become filled with anger and hatred towards their once cohabiting partners, leading to traditional and still unmitigated attitudes like "either you are mine or you're dead". According to Yıldırım's (2018) research, women are killed using methods such as firearms, sharp objects, strangulation, beating, and torture. The fact that men murder their spouses, with whom they once shared their lives, in such a savage manner is a clear indication of how negatively divorce is perceived by some men.

In the research, it has been observed that there are legal inadequacies in cases of female homicides during the divorce process. Women often state that obtaining a restraining order takes a long time, which is believed to increase the risk of being killed. Despite obtaining a restraining order, women can still be murdered. The failure to take necessary measures despite women expressing their fear of being killed by their spouses in their complaints to the prosecutor's office is considered a legal inadequacy. Men who had failed in their initial attempts to kill their spouses, after serving their sentences, made a second attempt to murder their former partners during the divorce process, and sadly, they succeeded in doing so. The penalties given after the first murder attempts are evaluated as attempted murder, and it is observed that the murder was prevented through the intervention of neighbors or the police. However, it is disregarded from a legal perspective that if there were no environmental factors, the man would not have abandoned the murder attempt, and he would have carried it out. As a result, it can be stated that penalties lack a deterrent effect.

The research indicates that both couples married for 3-4 years and those married for 20 years can be killed during the divorce process. However, due to the lack of sufficient data on the number of years the couples remained married in the news articles, it is not possible to make definitive conclusions. In the literature, divorces are more commonly observed within the first five years of marriage (Yıldırım, 2004). Therefore, it is believed that the risk of women being killed is higher during the early years of marriage.

In the research, since the occupations of both men and women were not provided in all the news articles, a definitive conclusion cannot be drawn regarding the relationship between education, occupation and committing murder for men during the divorce process, or the relationship between education, occupation and becoming a victim of murder for women. However, the comparison of the news articles where the woman's socio-economic status is known shows that having an independent profession that ensures economic independence for women is perceived as a threat by men to their authority and increases the likelihood of women experiencing violence. When a woman is not economically free, it becomes more difficult for her to challenge the authority of the man, and the man does not see the woman as a rival, leading to a decrease in the likelihood of violence. According to the literature, economically independent women with a good social status have less hesitation about divorce.

Men perceive a woman's economic independence and her ability to easily divorce as a threat to their authority, which makes women more susceptible to violence after divorce (Brownridge, 2006). However, there are also studies in the literature that contradict this idea. One study on divorced academics indicated that women reported experiencing less violence and less exclusion by their extended families after divorce (Uğur, 2014). Therefore, in the context of post-divorce violence, women's employment status, along with their economic independence, plays a crucial role. Women who achieve economic independence through high-status

professions in society experience less physical and emotional violence and are less affected by social exclusion after divorce.

Divorce and the committed murders also have an impact on children. The communication between family members greatly influences the mental health of children. The love and compassion shown by parents to each other and to their children play a crucial role in establishing trust and peace within the child. Growing up in a family where love, respect, tolerance, and understanding are fundamental ensures the well-being of children's mental health (Essizoglu et al., 2012). Divorce, on the other hand, means that children lose the family environment they were a part of and the benefits that environment provided to them. If a healthy divorce can be achieved, where the spousal subsystem is closed and the parent-child subsystem is continued, the children will be least affected by their parents' separation. More importantly, they will continue to receive the parental support they need for their psychosocial development and overall well-being. Therefore, it is essential to seek and implement ways to continue the parent-child subsystem in the best possible way.

According to the literature, the presence of children can be both a risk factor and a protective factor for post-separation violence. The mother gaining custody can provoke anger in some men and potentially lead to violence, whereas fathers who are concerned about losing their visitation rights may refrain from resorting to violence (Brownridge, 2006).

After making the decision to divorce, some women who return to their families' homes are advised by their relatives to reconcile with their spouses for the sake of the child and are sent back to their husbands. These reunions for the child can lead to violence against the woman (Can & Aksu, 2016). However, it is better for the child to live with a single parent than to live with both parents in an environment of constant violence and fighting. Sending their daughters back to their spouses who have subjected them to violence reflects patriarchal gender roles, disregarding the well-being of their grandchildren.

Women who divorce their partners due to experiencing violence are concerned about the safety, well-being, and welfare of their children after the divorce. Being separated from a violent spouse causes women to fear experiencing violence again and worry about their children's needs (Hardesty & Chung, 2006). This is because for over one-third of women who leave violent relationships, ending the abusive relationship does not mean an end to violence against them (Fleury et al., 2000).

Conclusion and Recommendations

Based on the analysis of newspaper articles published between 2016 and 2020, concerning femicides and femicide attempts during the divorce process, it is evident that the number of women killed during the divorce process increased each year. When examining at which stage of the divorce process women were killed the most, it was concluded that the highest number of femicides occurred during the divorce stage, specifically when women made their divorce intentions official. It has been observed that Istanbul is the city where femicides are most frequently committed, and women killed by their spouses are victims of extremely brutal and vicious murders.

When the reasons for men killing their spouses during the divorce process are examined, it is seen that the main cause of these murders is the "ex-partner syndrome," which results from their inability to accept the divorce and separation from their spouses and to close the marital subsystem in a healthy manner. The research results indicate that legal inadequacies also play a significant role in femicides.

The research results indicate that women face various problems throughout all stages of the divorce process, including being killed. However, it is believed that these issues can be addressed and resolved through necessary precautions, measures, and effective policies. In this context, the recommendations proposed by researchers are as follows:

These murders committed due to reasons such as wanting a divorce, being in the process of divorce, or having already divorced highlight the necessity of counseling services during the divorce process. The primary goal of family counseling is not to dissuade individuals from their divorce decisions but to change the meaning they attribute to divorce, make the process easier for them, and minimize potential risks that may arise from the difficulty of accepting divorce. During the divorce process, couples often struggle to establish healthy communication and find it challenging to reach a common ground, often resorting to conflict-ridden communication. According to the research, the recommendations and attitudes of extended families are also

found to be inadequate due to factors such as being related to the individuals going through the process and the society's still lingering negative views towards divorce. For all these reasons, it becomes essential to provide professional support during the divorce stage for couples to go through a healthy divorce and, more importantly, to survive.

During the divorce process, the existing structure of the family changes, and a new one is formed. Therefore, the efforts, dedication, and sensitivity shown during marriage should also be displayed during divorce. Just as the care shown during the marriage stage is effective in establishing the family structure healthily, a smooth and problem-free divorce process also helps couples create their post-divorce structure in a healthy way and adapt to the new situation.

If couples are assigned a counselor from the moment they file for divorce, the counselor can learn about the perspectives of couples and the meaning they attach to the divorce process. By reframing their perspectives through counseling, the meaning they attribute to divorce can be changed, and the anger towards the former spouse can be prevented. In this way, potential murders can be prevented.

For the well-being of the children after the divorce, counseling services are also necessary before the divorce. Through counseling, couples can become aware that the divorce not only affects them but also their children and be reminded that they are not just spouses but also parents with responsibilities. Even though the marital subsystem ends with divorce, the parental duties (parent-child subsystem) continue. If couples cannot go through a healthy divorce process, evidenced by the research findings, it not only negatively affects them but also their children, leading to the breakdown of the parental subsystem.

Finally, in our country where divorce rates are increasing, if couples are not provided with counseling services to facilitate consensus during the divorce process, or if such services are not made mandatory, the escalating divorce rates will continue to be accompanied by an increase in murders committed during the divorce process, as indicated by research findings. These findings demonstrate that the majority of female homicides or attempted homicides occur during the divorce phase, precisely when individuals formalize their decision to divorce. This situation cannot be resolved solely by increasing legal penalties and sanctions against men who commit violence against their partners. This is because when examining the research findings, it is observed that even individuals who have received restraining orders or have been imprisoned still go on to kill their partners after these measures have ended. This counseling service can be initiated with Istanbul being selected as a pilot city, considering that it is the location where the most number of female homicides/femicide attempts occur during the divorce process.

When we examine the practices of the Ministry of Family and Social Services (MoFSS) regarding the divorce process, we can see that there is a counseling service specifically focused on the "Family and Divorce Process Counseling Service". However, this counseling service is provided only when individuals apply voluntarily. The conclusion we reached from the research is that social services should make counseling services mandatory during the divorce process as part of preventive interventions (MoFSS, 2022).

This research attempted to demonstrate the impact of divorce on female murders. Our recommendation for future research is to conduct interviews with men who have killed their spouses during the divorce process to delve deeper into the reasons, psychology, and perspectives underlying their inability to accept divorce. This would provide valuable insights for the development of the content of the proposed counseling service.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Examination of Organizational Alienation with Bibliometric Analysis Method in National Literature

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Abstract: Today's employees desire to be appreciated and accepted by their superiors. This plays a fundamental role in the positive perception of the organization by employees. In this context, the alienation concept is becoming more crucial day by day. Accordingly, this study aims to examine the bibliometric features of the articles reviewed in Dergipark's infrastructure system in Turkey on organizational alienation. In this study, 26 articles published in Dergipark between 2014 and 2023 were analyzed through the bibliometric analysis method. In this context, the SPSS 25 package program was used while analyzing the data, and frequencies and percentages were examined. According to the results of the study, it was found that the number of studies on organizational alienation increased in 2021. It was determined that the subject area of the journals in which the articles are published is in the business field, which is included in the discipline of social sciences. It was concluded that the publication language of the studies is generally Turkish. It was determined that the said studies were generally performed in the production and service sectors. Quantitative research methods were used in all articles. In general, employees and teachers were sampled in the articles. The number of samples in articles was between 101 and 200. Furthermore, the most commonly studied concept related to organizational alienation has been organizational elements such as organizational culture. The most used keyword within the scope of the keywords in the articles was determined to be alienation. It was also found that the number of citations in the articles was between 1 and 10, and the most cited article was between 1 and 80.

Keywords: Alienation, Organizational alienation, National literature, Bibliometric analysis method.

Introduction

Organizations have entered into an intensely competitive environment with globalization. Organizations need to fulfill various responsibilities to survive in this competitive environment. These responsibilities create different obligations that employees have to fulfill. This situation can gradually lead to the self-alienation of employees. As a result, employees may feel alienation from themselves, existing values, and society (Orucu, et al., 2021, p.602). In this context, it can be expressed as organizational alienation that the employees act contrary to the traditions, manners, and customs of the organization as a result of some problems and troubles or do not attach importance to the duties they are obliged to do and alienate from the work (Güler et al., 2019, p. 213).

Alienation has been discussed at various times individually, socially, theologically, and politically. Hegel first referred to the concept of alienation philosophically (Copleston, 1985; Abd-Elrhaman et al., 2020, p. 2). Feuerbach studied alienation as religious. Feuerbach argued that people become alienated from themselves as a result of attributing the values they created to God. Marx began his discussion of alienation by criticizing Hegel and Feuerbach. Marx examined alienation within the framework of production and labor relations and private property (Marx, 1993, p. 140). In addition, Durkheim (1985) argued that alienation is anomie experienced as a result of the degeneration of social values (Yılmaz & Sarpkaya, 2009, p.314, as cited in Kovancı, 2020, p.103; Sasyd, 2022).

Organizational structure is efficient in the emergence of alienation. Alienation occurs more in organizations where the bureaucratic structure is efficient, a centralized decision-making system is used, and formal rules and policies are dominant (Sarros et al., 2002). According to some authors, the dissatisfaction of the employees in the natural working environment and the stress arising from this dissatisfaction are the main causes of alienation in organizations (Al-Baher & Jum, 2021, p. 1). In other words, inadequate and inconvenient working conditions in organizations cause alienation of employees, and in this case, employees consider work only as a financial instrument. Since employees with negative emotions do not have expectations, this causes them not to strive for the goals of the organization (Eroğluer, 2020, p. 329; Shehada & Khafaje, 2015, p. 83). It is also stated that there are changes in some personality traits of alienated individuals (Nef, 1980; Baim, 1981). If there is an unequal distribution of power between superiors and subordinates in organizations, and organizations have fewer professional staff, alienation would be greater (Etzioni 1964; as cited in Aiken & Hage, 1966, p. 498). However, professional employees reduce the level of alienation in organizations by exhibiting high-level professional behaviors while doing their duties (Goss, 1959; as cited in Aiken & Hage, 1966, p. 498).

Accordingly, it is emphasized in the theoretical framework of this study, what the organizational factors are in cases where employees experience organizational alienation, how these factors affect organizational alienation, and the importance of organizational alienation in terms of organizations. This study aims to examine the bibliometric features of the articles reviewed in the Dergipark infrastructure system in Turkey on organizational alienation. Since there is no study in which bibliometric analysis has been made in the national literature on this subject before, its contribution to literature is considered. Bibliometric analysis is the examination of studies published in any field using mathematical and statistical methods (Nebioglu, 2019; Ozel & Kozak 2012; Pritchard, 1969; as cited in Erkan, 2020, p. 152). The significance of this research is to evaluate the articles on organizational alienation through the bibliometric analysis method and to guide future studies.

According to the sequence in line with the progress of the research, the concept and scope of organizational alienation are referred to within the conceptual framework in its second part. In the third part of the study, the methodology of the research is also discussed. In addition, the research findings are discussed in the fourth part of the study. In the last part of the study, evaluations related to the conclusion and discussion are emphasized.

Conceptual Framework

The Concept and Scope of Organizational Alienation

The survival of an organization's life course depends on many factors. One of these factors is its workforce. Employees represent the workforce. The productivity and efficiency of employees depend on their relationship with the organization. The weakening relations, employees' withdrawal, and failure to share their competencies with the organization weaken the ties between the organization and employees and cause alienation (Zengin & Kaygın, 2016, p. 57; Al-Baher & Fraihat, 2022).

Alienation in social relations points out that individuals do not experience physical isolation in their interactions with other people, and also refers to a subjective feeling experienced by them (Santini et al., 2020; Stephens et al., 2012, p. 389). In other words, alienation represents the feeling of being in an irrelevant relationship (Kristensen & Kristensen, 2021, p.1847). When it comes to the concept of organizational alienation, it generally means that individuals alienate from values, expectations, relations, and rules connected to institutions and organizations (Fettahlıoğlu, 2006: 45; Buddhahun, 2019: 657). According to another author, organizational alienation is the state of the employees not placing too much importance on their job, being unwilling to work too much in work and working just for extrinsic rewards in general (Petersen & Kristensen, 2020; Agarwal, 1993, p. 723, as cited in Guler et al., 2019, p. 213).

Organizational alienation is defined as the state that occurs due to the inability to freely transform employees' knowledge, actions, and emotions into work. The concept of organizational alienation is also expressed as the dissatisfaction experienced by the employees in some cases, such as their authority, perspective on professional development and change, and expectation of being known and appreciated by their managers (Eryılmaz & Burgaz, 2011, p.273).

The factors that trigger organizational alienation can be grouped as organizational and environmental. Organizational factors are related to that some situations arising from the nature of organizations may cause alienation (Zengin, 2023, p. 63). In this case, organizational factors can be listed as a division of labor, management style, past events, and experiences, size of the organization, information flow, group characteristics

and modular relations, production style of the organization, beliefs, and attitudes, and finally working conditions. Environmental factors can also be expressed as the direct or indirect influences of political, economic, cultural, administrative, legal, scientific, and technological changes in the society of an organization (Soysal, 1997, as cited in Zengin, 2023, p. 61; Demirel & Unal, 2011, as cited in Zengin Kaygın, 2016, p. 57). Environmental factors can be listed as social and cultural structure, industrialization, urbanization and social disintegration, political and legal structure, unionization and mass media, economic structure and technological condition (Zengin, 2023, p. 61).

According to some authors, there are five different forms of alienation in organizations. These can be listed as the powerlessness of the employee in the organization, meaninglessness in the employee, normlessness in the organization, intra-organizational social isolation, and the self-estrangement of the employee (Soysal, 1997: 27). (a) Among these concepts, the employee's powerlessness can be expressed as the employee's lack of control over his own products and the results of the tools he uses in the production process. It can also be defined as the feeling that the employee cannot do or succeed alone (Soysal, 1997; 28). (b) Meaninglessness in employees can be defined as the employee's feeling of being unable to understand individual and social events and therefore thinking of no connection between the other work performed in the organization and his work (Başaran, 2004: 229). (c)

Normlessness in the organization is the state of employees being indifferent to the rules and norms determined by the organization and not adopting these rules. In this case, the consequences of alienation, indifference, and estrangement of individuals from accepted rules may occur. (d) In intra-organizational social isolation, the feeling of isolation, in general, is felt by employees who have not adopted the established values and rules or have only partially adopted them (Babur, 2009, p. 53). e) Self-estrangement of the employee means that the employees are alienated from themselves and unaware of their own existence and potential powers. Consequently, the employee, who cannot establish a relationship with the product or service he has created, gradually loses his relationship with his own existence and begins to experience alienation (Bayat, 1996, p. 84).

Research Methodology

Purpose and Significance of the Research

The purpose of the research is to examine the articles on the organizational alienation concept reviewed in the Dergipark infrastructure system in Turkey and to reveal from which aspects of the organizational alienation concept are examined. The significance of the research is due to the limited number of studies conducted with the bibliometric analysis method on organizational alienation in the national literature. The study was based on the articles published between 2014 and 2023. Specific parameters were used in the research.

Research Method

Research Sample

The target population of the research consists of articles about organizational alienation in the Dergipark infrastructure system. The research sample was determined as research articles conducted in the field of organizational alienation. All disciplines were preferred in selecting the sample. In the advanced search tab of the Dergipark infrastructure system, first of all, the articles with the search word "organizational alienation" in the title were searched. As a result of the search, a total of 26 articles were found in the system.

Data Collection Method

The research is structured with a qualitative approach and examines the articles on organizational alienation published in the Dergipark infrastructure system with the bibliometric analysis method. Bibliometrics is a method that applies mathematics and statistics to the written communication environment to comprehend the nature and course of a discipline (Pritchard, 1969). From a different viewpoint, bibliometrics can be defined as the measurement of texts and information (Norton, 2001). Bibliometrics is a useful contemporary tool that enables researchers to examine research areas and evaluate outputs and research results (Grant et al., 2000, as cited in Savrun & Mutlu, 2019, p. 373). In the direction of the research questions, frequency and percentage analyzes were made through the SPSS 25.0 program.

Research Findings

Bibliometric Analysis Results for Organizational Alienation

In this part, 26 articles on organizational alienation published in the Dergipark infrastructure system between 2014 and 2023 were examined within the framework of various parameters. Firstly, the data related to the years in which the articles were published are shown in Table 1.

Distribution of Articles by Years

Table 1 shows the distribution of research articles on organizational alienation conducted in Dergipark by years.

Table 1. Distribution of articles by years

Year	Frequency	%	Year	Frequency	%
2014	2	7.7	2019	2	7.6
2015	1	3.8	2020	5	19,2
2016	3	11.6	2021	6	23.1
2017	0	0	2022	4	15,4
2018	0	0	2023	3	11.6
			Total	26	100.00

According to the results of the data in Table 1, most of the research articles on organizational alienation were published as six (23.1%) articles in 2021. In this case, there has been an increase in the rate of articles by 2021. Moreover, five (19.2%) articles were published in 2020, four (15.4%) articles in 2022, and three (11.6%) articles in 2016 and 2023. In addition, two (7.7%) articles were published in 2014 and 2019. On the other hand, it is remarkable to publish no articles in 2017 and 2018.

Distribution of Journals' Articles by Subject Area

The distribution of journals in which the research articles on organizational alienation performed in Dergipark were published, according to the subject area, is shown in Table 2.

Table 2. Distribution of journals by subject area

Subject Area	Frequency	%
Social Sciences	25	96.2
Engineering Science	1	3.8
Total	26	100.00

In table 2, 25 (96.2%) research articles on organizational alienation were published in the field of social sciences and one (3.8%) in the field of engineering science, according to the subject area of the journals. in this case, the great majority of its articles are in the field of social sciences.

Distribution of Articles by Publication Language

The distribution of the research articles on organizational alienation performed in Dergipark according to the language in which they were published is shown in Table 3.

Table 3. Distribution of articles by publication language

Language	Frequency	%
Turkish	24	92.3
English	2	7.7
Total	26	100.00

Table 3 shows that according to the publication language of the journals, 24 (92.3%) of the articles are in Turkish, and two (7.7%) are in English. In this case, the great majority of its articles are published in Turkish.

Distribution of Articles by Sector

Table 4 shows the distribution of research articles on organizational alienation performed in Dergipark by sector. In Table 4, 13 (50.0%) of the articles were published in the production and service sector, 10 (38.4%) in the public sector, and three (11.6%) in the education sector. In this case, the great majority of its articles are in the production and service sectors.

Table 4. Distribution of articles by sector

Subject Area	Frequency	%
Production and Service	13	50.0
Public	3	11.6
Education	10	38.4
Total	26	100.00

Distribution of Articles by Research Method

Table 5 shows the distribution of research articles on organizational alienation performed in Dergipark by research method. In Table 5, 26 (100%) of the articles were published by the quantitative research method. In this case, all of its articles were made quantitatively.

Table 5. Research method of articles

Research Method	Frequency	%
Quantitative	26	100
Qualitative	0	0.0
Total	26	100.00

Distribution of the Articles by the Number of Samples Studied

Table 6 shows the distribution of research articles on organizational alienation performed in Dergipark according to the number of samples studied. According to the results of the data in Table 6, most of the research articles on organizational alienation were published as eight (32.0%) articles between 101 and 200 samples. In addition, five articles (20.0%) were published between 201 and 300 and between 301 and 400. In addition, three (12.0%) articles were published between 401 and 500 samples. Two (8.0%) articles were published between 0 and 100. One (4.0%) article was published between 501 and 600 and between 801 and 900. On the other hand, it is remarkable that there are no articles in the sample range of 601 and 700 and 701 and 800.

Table 6. Distribution of articles by number of samples

Years	Frequency	%
0-100	2	8.0
101-200	8	32.0
201-300	5	20.0
301-400	5	20.0
401-500	3	12
501-600	1	4.0
601-700	0	0.0
701-800	0	0.0
801-900	1	4.0
Total	25	100.00

Distribution of Employees

Table 7 shows the research articles on organizational alienation performed in Dergipark according to the distribution of the employees. According to Table 7, 7 (26.9%) of the employees generally work in companies. In addition, 5 (19.2%) of the employees work as teachers, 4 (15.4%) as academic and administrative staff, 3 (11.4%) as bank employees, 8 (32.0%) as tourism employees, and 2 (7.8%) as students.

Table 7. Distribution of employees

Employees	Frequency	%
Company	7	26.9
Public Institution	4	15.4
Bank	3	11.4
Teacher	5	19.3
Tourism	2	7.8
Student	2	7.8
Academic and Administrative Staff	3	11.4
Total	26	100.00

Distribution of Articles by Common Concepts

Table 8 shows the distribution of research articles in Dergipark according to organizational alienation and common concepts.

Table 8. Organizational alienation and common concepts

Words	Frequency	%
Job Satisfaction	2	7.7
Organizational Culture	2	7.7
Organizational Justice	2	7.7
Human Resources Management	2	7.7
Mobbing	2	7.7
Demographic Factors	2	7.7
Other	14	53,8
Total	26	100.00

According to Table 8, articles on organizational alienation and common concepts such as job satisfaction, organizational culture, organizational justice, human resources management, mobbing, and demographic characteristics were found to be two (7.7%).

Distribution of Articles by Keywords

Table 9 shows the distribution of research articles on organizational alienation performed in Dergipark by keywords, excluding the concept of organizational alienation.

Table 9. Distribution of articles by keywords

Keywords	Frequency	%
Alienation	8	30.8
Teacher	4	15.5
Loneliness/Organizational Loneliness	3	11.6
Organizational Culture	2	7.7
Mobbing	2	7.7
Human Resources Management	2	7.7
Secondary School Students	1	3.6
Job Satisfaction	2	7.7
Organizational Justice	2	7.7
Total	26	100.00

According to Table 9, the concept of alienation was generally used as a keyword eight times (30.8%). In addition, the teacher has an undeniable distribution as four (15.5%) and loneliness three (11.6%) keywords. In addition to this, organizational culture, mobbing, human resources management, secondary school students, job satisfaction, and organizational justice were used as keywords twice (7.7%).

Distribution of Articles by Citation Number

Table 10 shows the distribution of research articles on organizational alienation performed in Dergipark according to the number of citations.

Table 10. Distribution of articles by number of citations

Number of Citations	Frequency	%
0-10	19	73.0
11-20	3	11.5
21-30	2	7.7
31-40	0	0.0
41-50	0	0.0
51-60	1	3.9
61-70	0	0.0
71-80	1	3.9
Total	26	100.00

According to Table 10, 19 (73.0%) articles were cited, mostly between 0 and 10. In addition, three (11.5%) articles between 11 and 20, two (7.7%) between 21 and 30, one (3.9%) between 51 and 60, and one (3.9%) between 71 and 80 were cited. In this case, the highest citation was between 71 and 80.

Conclusion and Recommendations

In recent years, studies on organizational alienation have increased. As a consequence, organizational alienation has been one of the remarkable issues, especially in social and human sciences. In time, changes in organizational structures and advancing technology have increased the stress level of employees. However, the self-alienation and organizational alienation level of most employees is increasing. This kind of alienation reflects a feeling of inadequacy related to career advancement and professional development, as well as a feeling of inadequacy related to the job, in addition to the inability to fulfill professional norms (Marx, 1963, as cited in Aiken & Hage, 1966, p. 497). If the employees' expectations in the organizations are not satisfied and they start to see themselves only as production robots or encounter the harsh and unkind treatment of the managers, they may develop alienation or aggressive behavior towards the organization. Accordingly, it might be possible for employees to exhibit arbitrary behaviors within the organization with alienation, and therefore, an intra-organizational disturbance may arise (Bingol, 1990, p. 76, as cited in Guler et al., 2019, p. 213). Basically, organizational alienation can be defined as the situation in which individuals alienate from expectations, values, rules, and relations related to existing structures (institutions and organizations) in a general sense (Fettahlıoglu, 2006, p.45). From a different viewpoint, organizational alienation is defined as the situation in which employees do not attach much importance to their work, do not want to work more in their jobs and work more for external rewards, and it is expressed as the importance of this concept for the sustainable success of the organization (Agarwal, 1993, p. 723, as cited in Guler et al., 2019, p. 213).

A bibliometric analysis of organizational alienation was conducted within the framework of the articles published in Dergipark. In recent years, Dergipark, as a very well-functioning system, has been accepted academically in Turkey and has started to be used intensively. In light of this information, it is seen that more and more articles are published every year, especially on the subject of organizations and employees. In this context, studies on organizational alienation carried out for various disciplines in the national literature are included in this study.

In this study, some specific parameters such as the distribution of research articles on organizational alienation performed in the Dergipark system by years, the distribution of journals in which articles were published by subject area, the distribution of the articles by publication language, the distribution of the articles by sector, the distribution of the articles by research method, the distribution of the articles by the number of samples studied, the distribution of the articles by common concepts, the distribution of the articles by keywords, the distribution of the articles by the number of citations, were used. As a result, 26 articles on organizational alienation were analyzed in this study by using the bibliometric analysis method within the framework of ten parameters. According to the results of the research, it was found that the number of studies on organizational alienation increased in 2021. It was determined that the subject area of the journals in which the articles are published is mostly in the business field, which is included in the discipline of social sciences. It was concluded that the publication language of the studies was generally Turkish. It was found that these studies are mostly carried out

in the production and service sectors. The quantitative research method was used in all articles. In general, employees and teachers were sampled in the articles. The number of samples in the articles was between 101 and 200. Furthermore, the most commonly studied concept related to organizational alienation has been organizational elements such as organizational culture. The most used keyword in the articles was determined as alienation. It was also found that the number of citations in the articles was between 1 and 10, and the most cited article was between 1 and 80. In the national literature, there is no study related to the bibliometric analysis of organizational alienation similar to ours.

The use of the bibliometric analysis method, a research method that examines the characteristics of studies in a particular field with various analyses, is increasingly accepted in the organizational field. This study was performed due to the lack of comprehensive and up-to-date studies in the literature on the determination of the general structure and characteristics of the organizational alienation field within the framework of the bibliometric method. In this study, articles on organizational alienation in Dergipark, which is respected in the national literature, are discussed. This study intends to gain an idea about the articles published on organizational alienation, to provide benefits by examining the articles related to this subject in a general framework, and to shed light on the most efficient evaluation of this research. In this case, it is expected that the research on organizational alienation with the bibliometric analysis method in this study would guide the researchers. It is under consideration this study will make an important contribution to the literature in terms of revealing some factors. These results cannot be generalized internationally, since the subject of the study was only the articles in the Dergipark system due to the research limitations. In future studies, bibliometric studies on organizational alienation can be done in which different studies in the national and international literature are discussed together. In future studies, more detailed analyses can be made with different questions.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Moral Exemplars and Moral Followers on Twitter: Human Rights Activism and Politeness

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Abstract: Until recently, studies on moral exemplars focused on the characteristics or roles of exemplars in moral education. However, the issue of the possible effects of moral exemplars on their followers lacked adequate coverage in studies on psychology. Thus, the current study discussed the concept of moral following in the context of social media. The study conducted a comparison between Twitter users engaged in Malcolm X and human rights activists unengaged in moral exemplars. The accounts of moral followers (N = 20) were compared with those of human rights activists (N = 20). Tweets were subjected to content analysis, and categories related to activism were determined. The groups were compared in terms of the seven categories using the Mann–Whitney U-test. Statistically significant differences were observed between the groups in terms of impoliteness (U = 83; p < .01), prejudice/discrimination (U = 130; p < .01) and antisocial rights/justice-seeking (U = 126,5; p < .05). The results demonstrated that moral followers preferred offensive and impolite language. The findings were discussed in the context of possible explanations.

Keywords: Moral exemplar, Moral follower, Twitter, Politeness, Malcolm X

Introduction

How do moral characters, who are committed to certain moral attitudes and actions, impact prosocial behaviours? Studies in this context particularly emphasise the concept of moral exemplars. However, many studies use the terms *altruist* and *moral exemplar* interchangeably without discrimination. However, a moral exemplar refers to an individual who leads a life committed to moral values, such as serving humanity for the welfare of other people (Mastain, 2007), whereas an altruist lives in a motivational state with the goal of enhancing the welfare of another individual (Batson, 1991). One of the pioneering studies on moral exemplars is the book of Colby and Damon (1992) entitled 'Some Do Care' (Dunlop et al., 2012; Matsuba & Walker, 2005). According to their widely accepted definition, moral exemplars are 'people who have shown long-standing commitment to moral purposes, thus exemplifying good principles and virtues' (Colby & Damon, 1992). In addition, Rugeley and Van Wart (2006) defined moral exemplars as individuals who 'put their principles before their own immediate needs and happiness, even if this entails a cost'. The common features of moral exemplars include moral autonomy and respect for human life (Han et al., 2018).

Moreover, moral exemplars provide a means of examining phenomena, such as moral behaviour, altruism or prosocial behaviour. The lives, experiences or reactions of such people provide insight into these concepts (Mastain, 2007; Walker, 2013). For example, Mastain (2007) conducted a phenomenological investigation and concluded that the altruistic experiences of moral exemplars exhibited certain common features. Accordingly, moral exemplars can identify a person in need of help faster than others and easily shift their attention in this direction. They display an empathic response that leads to the motivation to help. Their empathy or compassion for a person in need of help is dependent of the history of their life span development. Thus, their moral values lend them with much ease in providing long-term care, concern or support to a person in need of help. In addition to the difficulties of helping, these people feel pleasure and satisfaction. Finally, they acquire deep insight into their acts because they have internalised altruistic actions and adapted them as an identity. Therefore, they differ in various aspects based on personality, which distinguish them from other people. They are more

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mature socio-cognitively and more committed to moral behaviour. Lastly, their prosocial and personal goals are more intertwined (Dunlop et al., 2012).

Moral exemplars are functional to society. Especially in moral education, they set an example for students in terms of learning moral values, attitudes and behaviours effectively and provide a portrait of how such moral values are to be manifested in practice (Han et al., 2018). Highlighting the importance of prototypes and examples on recognising and perceiving concepts is another method for understanding the role of moral exemplars in acquiring moral concepts and judgements (Stout, 2016). When viewed from the perspective of social learning theory, moral exemplars serve as inspiration for similar behaviours by evoking admiration for behaviour beyond providing information on approaches and possible actions in this regard through observation (van de Ven et al., 2019). Moreover, this sense of admiration and emulation plays a key role in the field of moral education (Vaccarezza & Niccoli, 2019; Zagzebski, 2017).

The characteristics of individuals considered moral exemplars are a controversial topic. Such attributes may vary by country, definition or context. Although moral exemplars are exemplified as historical or widely known heroes, philosophers, opinion leaders, authors, scholars, activist, religious or political leaders (Han et al., 2018; Mastain, 2007), the concept of moral exemplarity in studies on psychology is unlimited. In studies on moral exemplars, it is possible to identify individuals who worked for the benefit of humanity (e.g. Han et al., 2018; Mastain, 2007; Matsuba & Walker, 2005), such as Mother Teresa, Gandhi, Mandela and Martin Luther King, Jr; religious figures, such as Buddha and the Dalai Lama and philosophers, such as Kant, Aristotle, Plato and Hobbes (Han et al., 2018). Other studies also cite ordinary moral exemplars, such as officials with exceptional work ethics or volunteers serving the society (Dunlop et al., 2012; Rugeley & Van Wart, 2006).

The current study focuses on the role of moral exemplars in human rights activism. Specifically, it aims to examine the role of moral exemplars in human rights advocacy on Twitter, which is a social media platform where users can express reactions, concerns, demands, criticisms and opinions quickly and effectively. In line with this purpose, accounts that post admiration for a moral exemplar are categorised as moral followers. In general, a moral follower is an individual who admires and follows a moral exemplar considered a role model. The study considers that a Twitter user who specifically posts descriptions of a moral exemplar (i.e., quotes, account name or pictures) appreciates the exemplar's moral understanding. Thus, the study identifies Twitter accounts that advocate human rights activism in Türkiye and finds Malcolm X as a prominent moral exemplar. Malcolm Little (1925–1965), also known as Malcolm X (Muslim name: al-Hajj Malik al-Shabazz), is an Afro-American charismatic Muslim leader. After his death, he became a hero and a moral model for people from all walks of life, such as Muslims, African-American, libertarians and human rights defenders (Mamiya, 2020; Kose, 2003). Malcolm X followers and accounts without posts about moral exemplars were compared by content analysis in terms of tweets on human rights activism. Briefly, the study seeks the answer to following question:

Does following a moral exemplar on twitter influence human rights activism in terms of language, type or content of rights/justice-seeking?

Method

Sample

The accounts of moral followers (N = 20) were compared with those of human rights activists (N = 20). The criterion for identifying moral followers was that at least two of the following attributes are related to Malcolm X: account name, bio, header photo, profile photo or pinned tweet. The criterion for human rights activists was that the self-description of users should include human rights activist or human rights defender in the bio excluding any elements associated with a moral exemplar. Recent 30 tweets for each account were examined. Non-personal accounts (i.e. associations, institutions or organisations) and those with less than 30 tweets were excluded. Tweets, retweets and replies were examined. In quoted news tweets, only tweets were included in the analysis. If the same tweet was retweeted, each was treated as a separate tweet.

Coding

The study refrained from using commonly used programmes for qualitative analysis because they are based on word counts, which can be misleading. All tweet contents were focused. The target and null subject were also considered. Moreover, this analytical strategy introduces an important dilemma of qualitative analysis, that is,

objectivity versus reality (Koçak & Arun, 2006). Although such a dilemma frequently prompted researchers to compromise quantity, the implicit content of this study should not be overlooked.

The study searched for related categories in the tweets because the primary concern is the differences in human rights activism. For this purpose, tweets were subjected to a preliminary reading. Subsequently, prosocial or antisocial patterns were determined on the basis of the human rights axis. Out of 1,200, 468 tweets were classified into seven categories. A total of 732 tweets that could not be included in these seven categories were excluded from analysis. After creating categories, tweet content was read and coded using Microsoft Excel (2012). The categories were formulated on the basis of certain criteria, and each tweet was classified under relevant categories.

Table 1. Categories and criteria

Categories	N	Criteria	Example content*
Impoliteness	95 (%8)	Insulting, Bad word, Stigmatising or Humiliating	…shameless …troll …mistress …drunkard...terrorist
Prejudice/Discrimination	17 (%1)	Discriminatory, prejudiced words or ideas about a particular person or group of people	(Negative content towards a country, an association / group, a nation or a lifestyle)
Rights/Justice-seeking	157 (%13)	Expressing the injustice that a particular person or group suffered or demanding justice for them without directly targeting or criticising anyone (No subjective assessment was made about injustice or cruelty; the opinion of the account was considered)	...stand by the righteous…...no to racism …increase the minimum wage...calls for an end to the persecution of Uyghur Turks
Altruistic Tweets	25 (%2)	Announcing the need of someone in need, seeking help for her/him or caring about this	...Awareness towards the disabled...Call for help to orphans
Quotes	31 (%3)	Tweeting a prosocial quote or aphorism from a famous person	Prosocial quotes from philosophers, politicians or moral figures such as Malcolm X, Yunus Emre, Rumi
Antisocial rights/justice-seeking	24 (%2)	Insulting/marginalising in the name of defending rights	Accusing a particular ideological view of being inconsistent and spineless on the grounds that it is involved in injustice
Critical rights/justice seeking	119 (%10)	Expressing an injustice or persecution by censuring the perpetrator of it, aggressive defence	'Those who shout for women's rights are silent about the injustices suffered by men' 'India has become a dangerous place for Muslims'

*Since example tweets may violate the privacy of the analysed accounts, partial content or sample words are included in the examples.

Analysing implicit meanings provides in-depth information, whereas analysing content addresses the superficial part of the text (i.e. visible and countable physical elements). However, objectivity can be achieved and quantitative analyses can be possible only by using questions directed to data for coding in such analyses (Berg & Lune, 2015). After creating the categories, questions were asked to objectively classify the tweets. For example, does the tweet contain words considered insulting or bad words in Turkish or expressions of discrimination or exclusion regarding any social group or identity? Is the purpose of expressing victimhood or seeking justice indicated? Does it mention the perpetrator of such injustice or criticise the perpetrator? Such questions rendered the classification of relevant tweets easy. Neutral tweets unrelated to any of these categories were excluded.

Results

Statistical analyses for quantitative data were performed using SPSS version 20. Data were examined for conformity to parametric analysis using histograms, q–q plots and the Shapiro–Wilk tests. Non-parametric tests

were conducted because the preliminary analyses demonstrated that data were non-normally distributed (W =.47 to .91; p <.01). Table 2 provides the descriptive statistics of both groups.

Table 2. Descriptive statistics of the study

	Account information										
Group	N	Following ($\bar{X}$)	Followers ($\bar{X}$)	Joined ($\bar{X}$)	Impoliteness	Prejudice/ Disc.	Rights/ Justice Seeking	Altruistic Tweets	Quotes	Antisoc. rights/ justice seeking	Critical rights/ justice seeking
					(Mean rank)						
Moral followers	20	1347,5	2121,75	2016	26,35	24	17,25	22,30	20,55	24,18	19,55
No exemplar	20	1001,25	2896,20	2012	14,65	17	23,75	18,70	20,45	16,83	21,45

The groups were compared in terms of the seven categories using the Mann–Whitney U-test. Statistically significant differences were observed between the groups in terms of impoliteness (U = 83; p < .01), prejudice/discrimination (U = 130; p < .01) and antisocial rights/justice-seeking (U = 126,5; p < .05). Table 2 shows that the tweets of moral followers contain more impolite language than the no-exemplar group. In addition, they posted more tweets with opinions including prejudice or discrimination. Finally, they posted more tweets on antisocial right-seeking.

Discussion

This study revealed three significant findings. Individuals who were seemingly engaged in a moral figure on their Twitter account used a more impolite language, are more prejudiced and more marginalising in their human rights activism. These significant results suggest that moral followers on Twitter use antisocial social media by hiding behind moral exemplars.

How can this result be interpreted? One possible explanation is that moral exemplars on Twitter serve as a means of anonymisation. The group of moral followers appears to use moral exemplars as a shield for their aggressive activism. In addition, they may overcome the disturbing flaws in their tweets by associating their beliefs and moral struggles with those of moral exemplars. This concept can be explained better with moral disengagement theory (Bandura, 1999, 2002, 2016). That is, individuals can temporarily disengage themselves from internal standards. In turn, such standards do not restrain them from immoral acts. In other words, they perform behaviours that deviate from their moral standards without feeling conscientiously disturbed. One of the mechanisms they use is moral justification. This concept can be summarised as legitimising an action when it serves a worthy and moral end. Thus, moral followers on Twitter may fail to see their faults in establishing their sense of struggle and justice in an offensive manner. Perhaps, they may attribute this tendency to the aggressive style of Malcolm X. In this manner, the abovementioned identification may ignore such excessiveness. In addition, another mechanism of moral disengagement is euphemism. For moral followers, renaming can be a means of legitimising inappropriate tweets. As another mechanism, diffusion of responsibility should be considered in the context of anonymity. Studies on social psychology demonstrate that anonymity plays a role in various immoral behaviours (e.g. Diener, 1976, 1977, 1980; Diener et al., 1976; Haney et al., 1973; Zimbardo, 1969, 2007; Zimbardo et al., 1982). In relation, the anonymity, ease and speed provided by Twitter easily pave the way for the spread of hate and discriminating messages (Kalav & Certel Fırat, 2017).

Two main points should be considered in interpreting the findings. First, the identity of the moral exemplar being followed is important. A wide range of activists, philosophers, poets, religious or political leaders can be considered in this regard as each exemplar represents a different approach. Moreover, the same exemplar can pertain to various concepts in different cultures. For example, although Malcolm X is an idealistic hero for Muslims in Türkiye, African-Americans may view him as civil rights leader. In other words, the Muslim identity of Malcolm X is more prominent in Türkiye. However, it may pertain more to black identity in the USA. In addition, this group of moral followers consists of people from different socio-economic levels and cultural backgrounds across countries. Second, the research was conducted exclusively on Twitter. Thus, it may not be representative of individuals who can exemplify the concept of moral followers in real life. In real life, following

a moral exemplar denotes adopting thoughts, internalising norms and acting accordingly, which differ from the attributes related to exemplars in Twitter accounts.

Limitations and Conclusion

The results of the study should be interpreted given certain limitations. The first is that Malcolm X was not compared with other moral exemplars among Twitter users in Türkiye. In addition, the study cannot establish that the participants in the no-exemplar group do not follow a moral exemplar because only Twitter accounts were considered. In addition, the possible confounding variables, such as cultural differences, ideological views or level of education, which distinguish such groups from each other, should not be overlooked. Nevertheless, the study provides important information on the role of moral exemplars on Twitter. Thus, studies that examine real-life moral followers are required to collect in-depth information about the influence of moral exemplars on individuals in the relevant literature.

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Attitudes of Secondary School Teachers towards Gamification

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Abstract: The concept of gamification is increasingly being used in the classroom because of its impact on student motivation and engagement. The purpose of gamification is not to exclusively incorporate digital games, but to gamify activities through some game-based elements such as avatars, badges, virtual points, levels, stories, leaderboards, awards, etc. Although it is an approach with great potential, a review of the literature on the use of gamification in education has shown that it is more common in higher education and less common in schools. Since teachers play a key role in introducing innovations in the classroom, their attitude towards gamification is very important. For this reason, a survey was conducted among a sample of secondary school teachers to investigate their attitudes toward gamification. The paper describes a study conducted among teachers at a vocational secondary school where a previous study of gamification among students had been conducted, which showed that students were very satisfied with the use of various game-based elements such as points, badges, leaderboards, and stories. Teachers were asked about the use of gamification in their teaching practice as well as their attitudes towards gamification. The paper analyses the extent to which they are familiar with the possibility of gamification, whether they use game-based elements and/or digital tools for gamification in the classroom, and their reasons for using gamification. The reasons for not using gamification are specifically examined to determine what actions could be taken in the future to increase teachers' adoption of gamification and encourage its use in the classroom.

Keywords: Gamification in education, Game-based elements, Secondary school teachers

Introduction

Nowadays, game-based learning (GBL), serious games, and gamification are used in the educational process (Rugelj, 2015), among other modern approaches based on digital technologies to consider that students belong to the so-called "digital generations" or "Z-generations" (Robertson & Evans, 2020). While it is important to engage students in classroom or face-to-face (f2f) classes, it is even more important to engage students in online or hybrid instructional models, which are becoming more necessary and common today due to the COVID -19 pandemic (Rohman et al., 2020). In this context, the importance of gamification is increasingly emphasized.

Since 2010, the term gamification has attracted considerable attention due to its versatility and has become widely popular. While there is no universal definition of gamification that applies to all fields such as education, marketing, healthcare, etc., it is generally understood as the integration of specific elements and principles of game design into non-game environments. Gamification aims to enhance activities by incorporating game-based elements such as avatars, badges, virtual points, and levels, without being limited exclusively to digital games. (Gibson et al., 2013). Despite the potential for implementing gamification in education at various levels of

education, such as primary and secondary schools, universities, and lifelong learning programs, a review of the existing literature shows that it is used more often in higher educational institutions than in primary or secondary schools (Vrcelj et al., 2023)

This paper describes a study conducted among teachers in a vocational secondary school. The aim of this ongoing research was to investigate teachers' opinions about the use of gamification in their teaching practice as well as their attitudes towards gamification. In summary, the main contributions of this work were to determine the extent to which teachers are familiar with gamification, whether they use gamification in the classroom, and their attitudes toward gamification. Based on the findings, recommendations were made on how to encourage teachers to incorporate gamification.

Related Work

One of the recent papers (Vrcelj et al., 2023), which conducted a systematic literature review (SLR), examined relevant work on the use of gamification in primary and secondary schools to explore the field and make recommendations for future research. It was conducted in the field of school education because some previous research (Dichev & Dicheva, 2017; Mora et al., 2017; Hamari et al., 2014) has shown that gamification is widely used in higher education, which means that there is a lack of work showing the results of gamification in primary and secondary schools. The research identified the level of education, the instructional model, the subject, the learning and teaching methods and activities used in gamification, the digital tools and elements of game design, the nature and purpose of the research on gamification, and whether and in what ways gamification positively impacts students. Almost all of the 20 studies analyzed in detail were conducted in schools with students, but only 4 of them included teachers. All studies concluded that gamification has a positive impact, especially on student motivation, but also on more successful implementation of learning outcomes. The conclusion is that research on gamification should continue in order to propose appropriate pedagogical and technological frameworks that would facilitate the use of gamification in schools by teachers.

The research described in (Plantak Vukovac et al., 2018) included a survey of teachers about the use of gamification elements in classroom activities and about their attitudes towards gamification in general. The results showed not only that few teachers were familiar with the concept of gamification, but also that some of them expressed a disinterest in using gamification, mostly due to a lack of time to improve teaching methods through gamification.

In their paper, authors Laskowski and Borys (2016) present another study that focuses on the use of the concept of gamification and serious games among teachers, but in higher education, is Most of the respondents indicated that the reason for using gamification is that gamification makes teaching more interesting and increases students' motivation. The most common reason why they would not use gamification and serious games in their classes is that they think gamification is a fashion trend and they do not want to create gamified materials.

Authors Martí Parreño et al. (2016) emphasized that teachers play a key role in introducing pedagogical and technological innovations in the classroom, including gamification, so their attitude towards gamification is very important. The results of the survey they conducted showed that gamification is still a trendy method that only a small percentage of teachers use regularly in their courses, but that teachers' attitudes toward gamification are still positive.

Alabbasi's (2018) study aimed to investigate teachers' perspectives on the use of gamification techniques in online learning. The results showed that teachers are positive about the use of gamification tools in online learning. Most teachers believe that elements of game design improve learner motivation, although some pointed out the possibility of negative effects due to the competitive nature of gamified learning.

It is also worth highlighting the author's own research (Vrcelj et al., 2022) on the implementation of gamification in secondary school computer science classes, conducted among students at the same vocational school. According to the results of the survey, students were very satisfied with the use of various game elements such as points, badges, leaderboards, and stories. Most students found gamification entertaining and would like to use gamification in other subjects, not only in computer science. In order to achieve this, it is crucial that teachers accept gamification, as they are key to introducing innovation in the classroom and their attitude towards gamification is very important. For this reason, this preliminary study was conducted on a sample of teachers from the same vocational high school to investigate their attitudes towards gamification and to lay the groundwork for further research.

Terminological Definition of Gamification

One of the most common descriptions used to define gamification is that it is the application of certain elements and principles of game design in non-game contexts. The concept of gamification was introduced by British programmer Nick Pelling in 2002 (O'Donovan et al., 2013). The goal of gamification in education is to increase students' interest and motivation and to engage them more deeply in the teaching process through the use of various elements of game design (Robertson & Evans, 2020). The use of gamification elements promotes student motivation and engagement in the classroom and even more successful adoption of learning outcomes (Plantak Vukovac et al., 2018; Park & Kim, 2021; Martínez Hita et al., 2021). In the literature, terms such as gamification in education, educational games and learning through games are very often confused with each other. Although the differences between these terms are minor and all have the primary goal of increasing motivation and success in learning through games, it is important to accept that the terms are not synonymous (Santos et al., 2013; Todor & Pitica, 2013).

The term game-based learning (GBL) refers to a learning process that uses digital games to motivate students to achieve specific learning outcomes (Raymer, 2011). Learning through games takes place through playing and developing games while promoting critical thinking and problem-solving skills. Although GBL can encompass a variety of games (today they are mostly digital games), games commonly referred to as educational games or serious games are the most common.

Educational games can be described as interactive, competitive lessons with defined learning outcomes that allow students to have fun while acquiring knowledge (Rugelj, 2015). They differ from other games in that their goal is not just fun, but they contain a clearly defined pedagogical component, i.e., learning outcomes that must be achieved. However, well-designed educational games provide entertainment and have hidden learning content, and learners achieve the required outcomes unconsciously by progressing in the game (Dichev & Dicheva, 2017). Gamification in education refers to the application of elements of game design and game principles in the classroom to increase student motivation and engagement (Fui-Hoon Nah et al., 2014; (Osatuyi et al., 2018). Gamification uses mechanics, aesthetics, and thinking from the player's perspective to engage students and promote learning and problem solving (Palova & Vejačka, 2020). It should be emphasized that the big difference between gamification and educational (serious) games is that gamification does not require a complete digital game design. Instead of designing the most expensive educational game, simple, often free, digital tools such as a learning management system (LMS) and quiz tools can be used for gamification (Vrcelj et al., 2021).

Popular digital tools or e-learning platforms that are not exclusively intended for gamification but have the ability to implement game design elements are: Moodle, Izzi Quizzi, Kahoot!, Mentimeter, Math Widget, ClassDojo, Science LevelUp!, PeerWise, etc. (Vrcelj et al., 2020). There are a number of other digital tools that can be used to implement gamification, and it should be noted that many authors develop specific tools or gamified e-learning systems for gamification of the teaching process, such as Math Widget (Jagušt et al., 2018).

As mentioned earlier, gamification uses various elements of game design to increase the motivation and engagement of participants. Each game must contain clearly defined rules that guide the participant to progress in the game and achieve their goals, and these elements are integrated into the gameplay. During the activity, it is possible to combine different elements of game design, such as points, leaderboards, virtual badges, etc. Based on research and review of works (Dichev & Dicheva, 2017; Hamari et al., 2014; Fui-Hoon Nah et al., 2014; Plantak Vukovac et al., 2018), the most common elements of game design used in educational process and learning context are highlighted and described. Points are the simplest form of reward and the most common element in almost all games to provide feedback. Depending on the points earned, users can see opportunities for progress and improvement (Fui-Hoon Nah et al., 2014). Leaderboard is the second most common element of game design and is often used in combination with points. It is also used to motivate students and often emphasizes competition, i.e., it encourages a competitive spirit among students. In practice, only the best results are often presented to avoid demotivating students with lower ranks in further learning (O'Donovan et al., 2013).

Badges are virtual medals awarded as a sign of success, achievement of a level, or recognition for goals accomplished. The goal of digital badges is to encourage students to be more engaged and successful in completing activities. In order for students to win a digital badge, they need to know what conditions must be met. From the teacher's perspective, the earned digital badge can be a proof of achievement, while from the student's perspective, the earned digital badge can be positive feedback (Gibson et al., 2013). According to some research, more than 90% of students believe that using the badge system in their daily learning routine motivates

them and helps them focus in class (Santos et al., 2013). The storyline or story is an element that helps students achieve an ideal interest curve and stay motivated throughout the learning process. The story is conveyed narratively in the game and helps illustrate the applicability of the concepts in real life.

Avatars are graphical representations of players created or self-selected by users in a digital tool. With the avatars created, users introduce themselves to other users in the community. Research shows that students' interests increase after using avatars compared to their interests before using avatars (Todor & Pitica, 2013).

Prizes/rewards are elements of game design that also affect student motivation. The type of reward depends on the complexity of the task and can be tangible or intangible. Analysis of studies has shown that it is better to distribute multiple rewards evenly over a period of time rather than giving one large reward at the very end (Raymer, 2011).

Feedback is a very important element in the learning process as it provides quick feedback on the current level of engagement of the student. Levels/stages are elements used in various game designs to give players a sense of progression. Levels are often grouped by difficulty, so that each successive level requires more knowledge, effort, and skill from users. Challenges are an element whose goal is to encourage the user to complete tasks. It is noted that part of the gameplay study emphasizes a combination of the following three game design elements that are most common in implementation: Points, Badges, and Leaderboards, which is why the acronym PBL is often used in the literature (Dichev & Dicheva, 2017).

Method

The purpose of this research was to investigate teachers' opinions about the use of gamification in their teaching practices. The research determined the extent to which teachers are familiar with the concept of gamification, the frequency of using game design elements, and teachers' attitudes toward gamification. The research methodology is based on a quantitative research method supported by a survey of teachers. By analyzing the data collected, the following research questions could be answered:

Q1: To what extent are teachers familiar with gamification?
Q2: To what extent do teachers actually use gamification?
Q3: What are teachers' attitudes toward gamification?

Study Design and Procedure

The survey was conducted among the teachers at the Civil Engineering Technical School. The study included 28 teachers (33 total, 85% response rate). It is worth noting that during the same school year, a training on gamification and the use of gamified activities was conducted with teachers. The training was delivered by external staff from CARNET (Croatian Academic and Research Network), so it was expected that teachers would be familiar with the possibilities of using gamification. The survey was conducted in February 2023 by sending paper surveys to teachers. The survey consisted of five sections with a total of 33 questions. Some of the questions were adapted from the study conducted by Plantak Vukovac et al. (2018) with a similar population, but there are also some new questions based on recent research on gamification in high schools.

The first group of questions explored the profile of teachers, the second includes questions about familiarity with the concept of gamification, the third group includes questions about the use of gamification in the classroom, while the fourth group explores teachers' attitudes toward gamification. The last open-ended question refers to additional comments about gamification, such as the general impression of the activities and suggestions for future improvements.

Results and Discussion

The Teachers' Profile

The survey was conducted at the Civil Engineering Technical School in Rijeka, with the participation of 28 teachers, where 85% of teachers completed the survey. The survey consisted of several parts, where the first section focusing on the teachers' demographic information. Regarding the age of the respondents, the highest

proportion of teachers (25%, n=7) fell within the age range of 36-40 years old, while the smallest number (only one teacher) was under 30 years old (Figure 1).

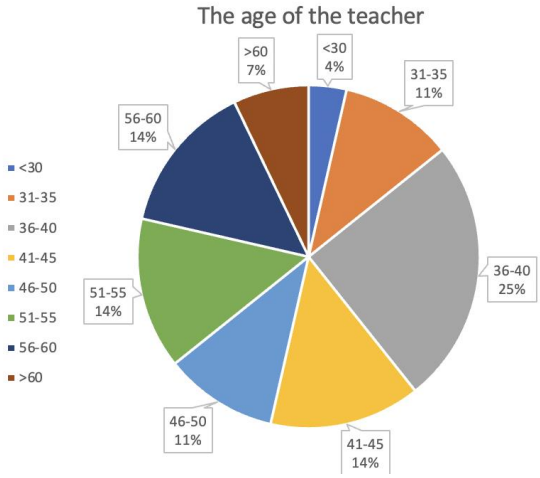

Figure 1. The age of the teacher

Looking at the years of professional experience (Figure 2), it can be noticed that all age groups were represented, and the largest number of respondents (25%, n=7) have between 6-10 years of professional experience, slightly fewer respondents (21%, n=6) had over than 26 years of professional experience, while the smallest proportions were observed among teachers with less than one year (4%, n=1) and those with 21-25 years of experience (4%, n=1).

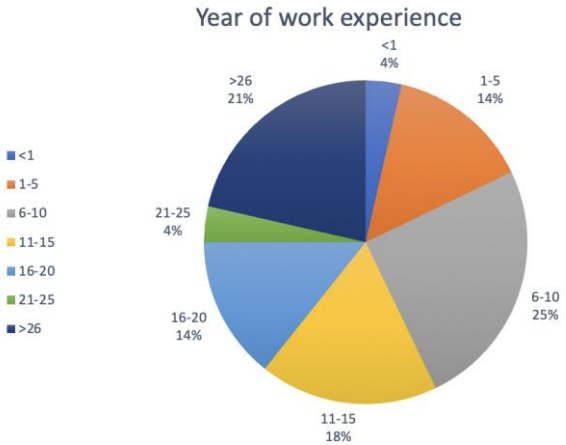

Figure 2. Years of work experience

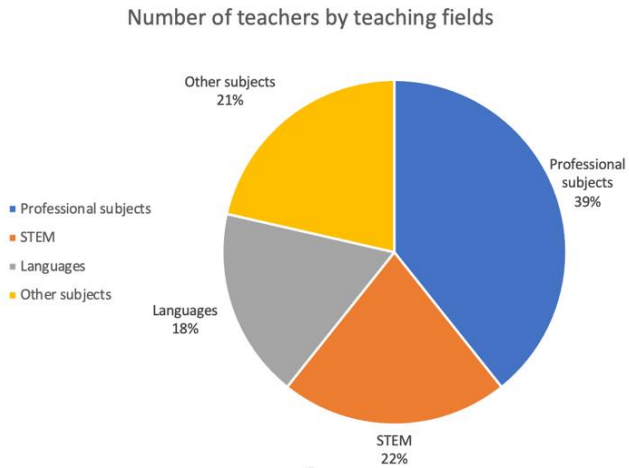

Figure 3. Number of teachers by teaching fields

It should be noted that the respondents are teachers from various fields (Figure 3). STEM (Science, Technology, Engineering, Mathematics) field includes subjects such as Mathematics, Physics, Chemistry, and Biology. Languages include subjects Croatian Language, English Language, and German Language. Examples of subjects included in category vocational subject are Interior Design, Technical Drawing, Architectural Constructions, Road organization, Design geometry, Geodetic survey. Other subjects are History, Geographics, Ethics, Religious education, and Physical Culture. The highest percentage of teachers belongs to vocational subjects (39%, n=11), followed by STEM fields (22%, n=6) and other subjects. The smallest proportion is observed among language teaching subjects (18%, n=5).

Familiarity with the Use of Gamification

The second part of the survey included questions about the use of gamification in teaching. A 5-point Likert scale (0 - not at all, 1 - a little, 2 - moderately, 3 - to a greater extent, 4 - completely) was used to collect data. The goal of the survey was to find out the extent to which teachers are familiar with the concept of gamification and what game design elements and digital tools they use in the classroom to apply gamification. When asked about familiarity with gamification in the classroom for motivating students, most of the respondents (57%) believe they are moderately familiar with the possibilities of gamification for the purpose of motivation.

Regarding familiarity with elements of game design, about one-third of respondents (35%) indicated that they were familiar with the concept of elements such as points, badges, avatars, etc., while another third indicated that they had limited or no familiarity with such concepts. Regarding the last questions in the first section about familiarity with using digital tools and platforms for gamification, 21% of respondents indicated that they were completely or somewhat familiar, while 25% indicated that they were little or not at all familiar. However, most teachers (54%) believe they are moderately familiar with the use of digital tools and platforms for gamification (Figure 4).

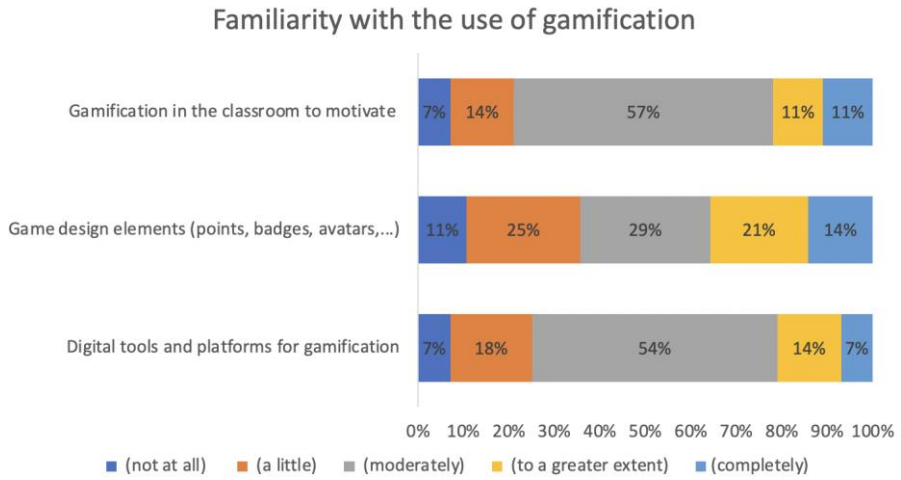

Figure 4. Familiarity with the use of gamification

Application of Gamification in Teaching

The third part of the survey addressed whether teachers use gamification in learning and teaching. For the questions related to the application of game design elements and the use of digital tools and platforms, respondents were asked to choose one of the offered answers on the scale: 0 - never, 1 - rarely, 2 - sometimes, 3 - often, 4 - always.

In terms of the type of game design elements used, most respondents (35%) indicated that they use points to a significant or great extent. The next most common element in terms of frequency of use was leaderboards (25%). Very low results were obtained for application design elements such as badges, where 82% of respondents indicated that they do not use this element of game design at all; an even lower result was obtained for the use of avatars, where 86% indicated that they do not use them. Only two respondents (4%) indicated that they use avatars and badges, and only three (7%) use stories in their lessons (Figure 5).

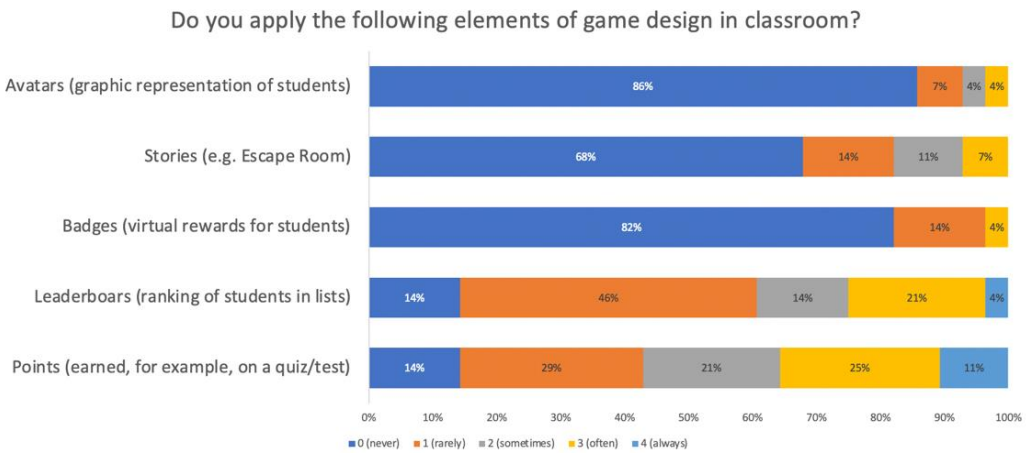

Figure 5. Using game design elements in the classroom

The study also looked at what digital tools or platforms respondents use to implement gamification in the classroom (Figure 6). It was found that the majority of teachers (39%) use the digital platform Loomen, which already includes features such as quizzes, Million Games, Memories, etc. The digital tool Kahoot! was used more frequently or very frequently by 22% of the respondents, while Quizziz was used very frequently by 18% of the participants. It is noteworthy that 64% of respondents indicated that they did not use any application to create quizzes or tests. A slightly smaller number of respondents (11%) use Genially in their teaching, but 75% of respondents do not use this platform at all.

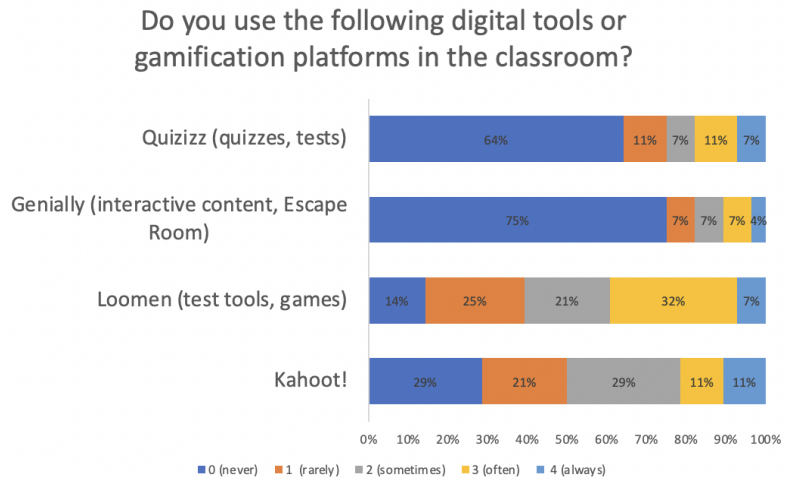

Figure 6. Using digital tools or gamification platforms in the classroom

Teachers' Attitudes towards Gamification

The fourth section of the survey examined respondents' attitudes toward gamification. A 5-point Likert scale was used to collect data (0 - strongly disagree, 1 - disagree, 2 - neither agree nor disagree, 3 - agree, 4 - strongly agree). The statements were divided into four parts that addressed teachers' attitudes toward using gamification in the classroom (Figure 7), teachers' attitudes toward motivation and encouragement in using gamification (Figure 8), teachers' views on the reasons for not using or insufficiently using gamification in the classroom (Figure 9), and teachers' views on factors that would encourage them to use gamification in the future (Figure 10).

Regarding attitudes toward using the gamification in the classroom, the results showed very positive responses (Figure 7), with 57% of participants agreeing or strongly agreeing that gamification increases student interest in the subject. In addition, a significant majority of 67% confirmed the competitive approach to assignments when gamification is used. Regarding the impact of gamification on student attendance and enthusiasm for class, 47% of respondents strongly agreed that gamification noticeably increases students' desire to participate joyfully in class. Most teachers (68%) neither agree nor disagree with the statement that students get better results by using gamification. However, when asked if gamification contributes to better understanding of subject matter, a

significant proportion of respondents (49%) strongly agreed that it does. Similarly, a majority (61%) confirmed that gamification does indeed boost students' motivation to learn to a great extent. It is worth noting that only one teacher held a strictly opposite opinion: this respondent disagreed with all statements that gamification has a positive impact on students.

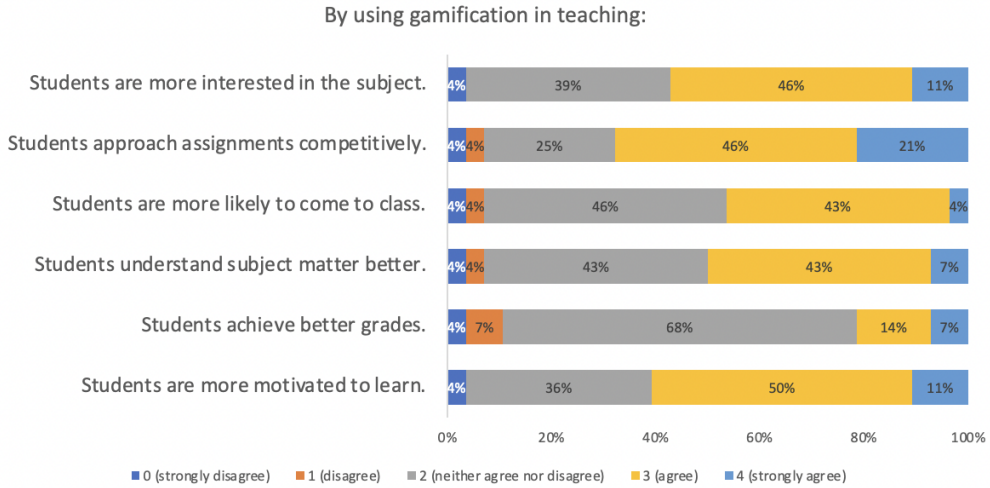

Figure 7. Attitudes toward using gamification in the classroom

The next part of the survey focused on teachers' attitudes toward motivation and encouragement in the use of gamification (Figure 8). It is important to highlight that teachers in all statements expressed a strong desire to use gamification, agreeing or strongly agreeing that they want to achieve a higher quality of teaching (69%), increase student engagement (86%), make the subject more attractive and interesting for students (82%), achieve a better quality of teaching (78%), modernize teaching (82%). Of the five statements presented, only in one statement related to the modernization of teaching, two teachers express hesitation about modernizing their teaching practices.

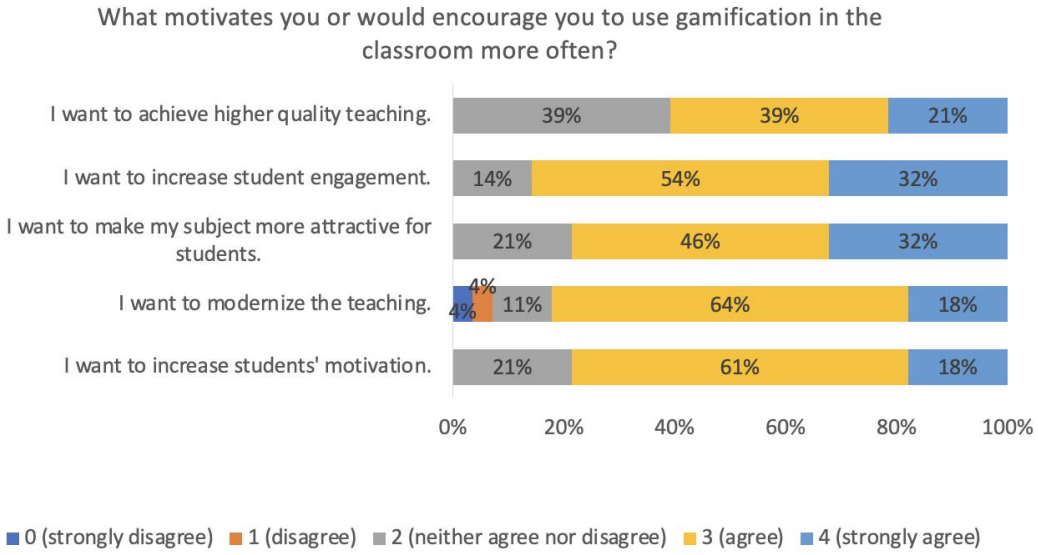

Figure 8. Attitudes toward motivation and encouragement in using gamification

When asked about the reasons for not using or insufficiently using gamification in the classroom (Figure 9), the majority of teachers (36%) stated that they cannot devote enough time to creating and implementing gamification activities. Additionally, 18% of teachers expressed a lack of knowledge about creating gamification activities. A slightly smaller number of respondents (11%) believed that gamified activities are not beneficial to students. Only one teacher believed that using gamification in the classroom is an expression of frivolous teaching. It is worth noting that none of the respondents cited a lack of support from supervisors as a barrier to using gamification in the classroom, and only 15% of teachers felt that gamification was only a passing trend.

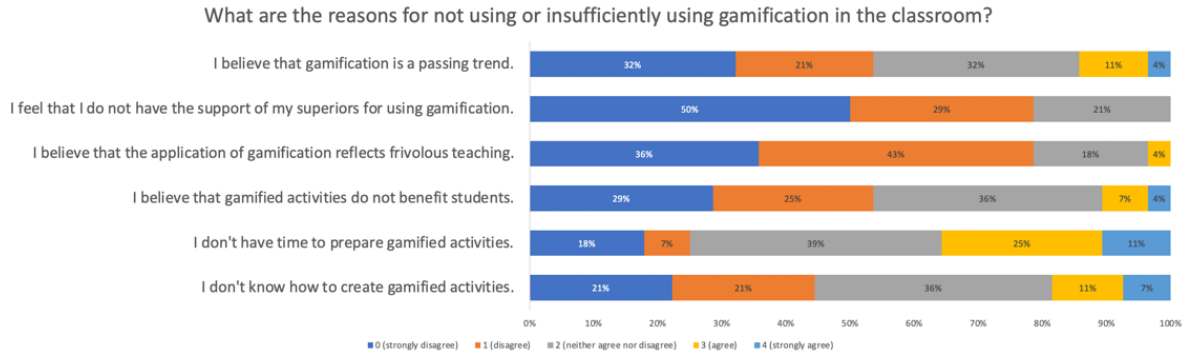

Figure 9. Views on the reasons for not using or insufficiently using gamification

The final question on the survey asked teachers about the factors that would motivate them to use gamified activities more frequently in their classrooms (Figure 10). The largest percentage of respondents (78%) indicated that more free time would encourage them to incorporate gamification into their teaching. In addition, 68% of respondents believed that more available digital tools/platforms would encourage and motivate them to use gamified activities. The same number of respondents believed that adequate computer equipment would motivate them to implement gamification activities.

In addition, 57% of respondents said they would be motivated to use gamification more if they received training or workshops on how to use and create gamification activities. In addition, more than half (72%) indicated that an expert mentor would be helpful in overcoming difficulties and further motivating them to use gamification.

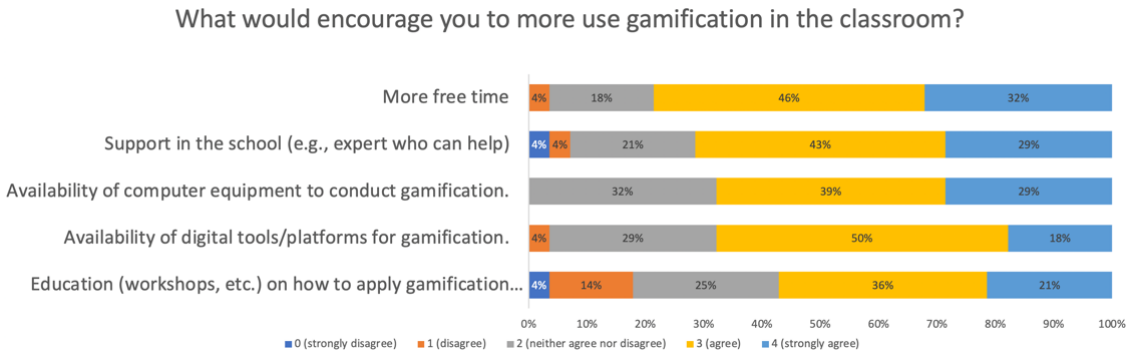

Figure 10. Views on factors that would encourage them to use gamification

Teacher's Comments

In the last part of the survey teachers were given the opportunity to express their additional comments regarding gamification. There were only a few comments which were all positive:

“Gamification help to give students feedback faster.”

“I consider gamification useful when students need to increase their motivation, and it will certainly become part of my teaching.”

“I like to use gamification to get more students' attention.”

Discussion

This study was conducted to answer the research questions Q1: To what extent are teachers familiar with gamification? Q2: To what extent do teachers actually use gamification? Q3: What are teachers' attitudes toward gamification? To summarize the findings related to research question Q1, the second part of the survey showed that the majority of respondents were only moderately familiar with gamification and that only one-third of

them were familiar with game design elements such as points, leaderboards, and badges. Teachers' knowledge of digital tools and platforms for gamification is also insufficient.

To investigate the actual use of gamification in the classroom (Q2), the third part of the survey examined the extent to which teachers use the most common game design elements and popular digital tools and platforms for gamification in the classroom. It was found that teachers use points and leaderboards, which is positive, but on the other hand, they should be encouraged to use other elements such as avatars, stories, and especially badges. A combination of points, badges, and leaderboards (PBL) is very commonly used for gamification and has been shown to be successful in literature (Dichev & Dicheva, 2017). Regarding the use of digital tools and platforms, the most popular tool is Kahoot! and the most popular platform is Loomen (Vrcelj et al., 2021). The Loomen digital platform is the Moodle version of the learning management system (LMS) used in Croatian schools. It already includes features such as quizzes and games (e.g., Memory, Millionaire), and teachers who are familiar with this LMS should be encouraged to use it more for gamified classroom activities.

The most extensive part of the questionnaire dealt with teachers' attitudes toward gamification to answer Q3. It asked what teachers thought about the positive impact of gamification on students, and the results were very positive. The majority of respondents recognized the benefits of gamification, especially in terms of students' greater interest in a particular subject and their greater motivation to participate in classroom activities. Teachers also felt that gamification could help them make their subject more attractive to students and increase their engagement in learning. When giving reasons for not using gamification, very few teachers felt that gamification was not useful for students and that it was frivolous teaching. The vast majority stated that the disadvantage was that they did not have enough time or did not know how to prepare a gamified activity. Of particular importance was the final question of the study, which sought to explore what elements might help teachers make greater use of gamification. It was found that in addition to more free time, the availability of computer equipment, gamification tools, proper training, and the help of an expert would be helpful.

If we compare this study with similar studies (Plantak Vukovac et al., 2018; Laskowski & Borys, 2016; Martí-Parreño, 2016; Alabbasi, 2018), we can find similarities in the use of gamification and the reasons for using and not using gamification. However, it should be emphasized that the respondents in this work showed a greater interest in using gamification than in (Plantak Vukovac et al., 2018) and did not indicate that gamification is just a fashion trend as in (Laskowski & Borys, 2016; Martí-Parreño, 2016) or the possibility of negative elements of gamification as in Alabbasi (2018).

One of the differences between this study and the studies described in (Plantak Vukovac et al., 2018; Laskowski & Borys, 2016) is that no statistically significant relationship was demonstrated between respondents' age or years of work experience and their knowledge of and attitudes toward gamification. Similarly, the study did not show that there was a correlation between the statements about gamification and the subjects taught by the teachers.

Conclusion

This study is ongoing research on the use of gamification in education, which aims to investigate teachers' opinions about the use of gamification in their teaching practice. Based on a quantitative research method with a survey, data were collected from secondary school teachers. The results of the study revealed the extent to which teachers are familiar with gamification and how they incorporate elements of game design into their teaching. The results showed that most teachers were only moderately familiar with gamification and only a limited number of them were well acquainted with game design elements such as points, leaderboards, and badges. In addition, their knowledge of digital tools and platforms for gamification proved insufficient.

Despite this limited familiarity, the research showed that teachers recognized the benefits of gamification in the classroom. They acknowledged that gamification stimulates students' interest in certain topics and motivates them to actively participate in classroom activities. In addition, teachers saw gamification as a means to make their subjects more attractive to students and to increase student engagement in the learning process.

An important aspect of the study was to explore the factors that might encourage teachers to use gamification more widely. The results indicated that access to more free time, availability of computer equipment, gamification tools, adequate training, and expert guidance would strongly support teachers in incorporating gamification into their instructional practices.

Based on these findings, the conclusion of the research suggests that while teachers at the Civil Engineering Technical School in Rijeka acknowledge the potential of gamification in education, further efforts are needed to improve their familiarity with the concept and implementation of game design elements in the classroom. To improve the integration of gamification in the classroom, it could be beneficial to provide teachers with more resources, training, and expert support. This support could enable teachers to better use gamification as a pedagogical tool, which would ultimately lead to higher student engagement and better learning outcomes.

As with any research, it is important to acknowledge the limitations of the study. The main limitation of the study described is that the study was conducted with a small sample of respondents. The sample of 28 participants is small for quantitative research and may limit the generalizability of the findings. Another limitation is that the study was conducted in one educational institution, and the results may not be entirely representative of all teachers' opinions about gamification in other institutions or regions. In addition, the study could be further expanded by exploring the challenges or barriers teachers face in implementing gamification in their classrooms. Overall, the study serves as a valuable starting point for understanding teachers' attitudes and experiences with gamification and lays the groundwork for future research in this area. Future plans include conducting further systematic research on gamification to propose appropriate pedagogical-technological frameworks that facilitate the application of gamification in schools.

Recommendations

To address the issues highlighted in the survey, here are some recommendations to improve teachers' familiarity with gamification:

- Organize professional training for teachers on gamification to familiarize them with the concepts of gamification and the elements of game design. These trainings can be organized as workshops or online courses and delivered by experts in the field or by educators who have successfully implemented gamification in their classrooms. For teachers who prefer self-paced learning, online resources on gamification can be made available.
- Provide teachers with adequate classroom computer equipment and a variety of easy-to-use gamification tools and platforms. Teachers can participate in practical training and experiment with different gamification tools and platforms. Hands-on experiences will help them understand how to effectively incorporate these elements into their teaching methods.
- Support teachers with both experts and other, more experienced colleagues, and encourage teachers to collaborate and share their experiences with gamification (e.g., success stories and case studies of teachers who have used gamification effectively in their classrooms). This can be done through teacher forums, social media groups, or within the school's professional learning community. One option is to establish a peer mentorship program where teachers who are more familiar with gamification can guide and support their colleagues who have less experience in this area.

By implementing these recommendations, teachers can improve their familiarity with gamification, game design elements, and digital tools, ultimately leading to more engaging and effective learning experiences for their students.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements and Notes

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Investigating AI-Powered Tutoring Systems that Adapt to Individual Student Needs, Providing Personalized Guidance and Assessments

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Abstract: This comprehensive literature review seeks to assess the potential of AI-powered tutoring systems that are able to adapt and provide personalized guidance tailored to individual student needs. As Artificial Intelligence (AI) technologies continue to progress at a rapid rate, there is ever increasing interest in leveraging these capabilities for educational purposes. By offering customized instruction based on each student's strengths, weaknesses, and learning style preferences, AI-powered tutoring systems may revolutionize how students learn. The review will examine various studies and research papers exploring the design, implementation techniques as well as effectiveness of such innovative solutions. This includes delving into algorithms like machine learning, natural language processing or data mining which enable these systems to adjust their interactions according to students' requirements. Moreover, it will investigate any positive impacts such personalized teaching has had on academic performance levels in addition to engagement motivation amongst learners. Additionally, this study shall look into existing challenges faced when using AI-powered tutoring systems; from ethical concerns about privacy issues thought too effective teacher -student communication. After taking all findings from available literature into account we can then identify areas where more work is needed, offer suggestions for future improvements or studies within this field. In conclusion, with our synthesis of insights gathered during our investigation we hope improve awareness & understandings around utilizing AI technology for educational purposes so that teachers & students alike can benefit from personalized adaptive educations experiences.

Keywords: AI-powered tutoring systems, Adaptive learning, Machine learning

Introduction

Higher education institutions (HEIs) are increasingly embracing technology, which is significantly changing the educational landscape. The traditional educational system has changed due to innovations such as enhanced learning structures and virtual reality classrooms. Through a variety of tools, resources, and the direction of teachers and mentors, technology-supported learning enables students to improve their knowledge and abilities (Gros, 2016).

Technology can expand curricula and offer students more exciting learning opportunities, according to information technology and information systems educators (Pappas & Giannakos, 2021). However, issues with the rigidity of online learning platforms have been raised. To correctly solve this problem, complex learning algorithms have been created in response. A game-changer in the educational system is using cutting-edge data analytics and artificial intelligence (AI) methods. In order to adapt educational content and make it relevant to specific student needs, modern learning platforms use historical data from prior users (Hasanov et al., 2019). Intelligent tutors and learning analytics are only two examples of AI-enabled learning systems that provide personalized feedback and direction to students, significantly increasing their learning experience.

Numerous AI-enabled learning systems, including intelligent tutors and learning analytics, have emerged due to advancements in AI research. These developments have been helpful in education because they give pupils personalized feedback and guidance, which promotes a more efficient learning process (Moreno Guerrero et al.,

n.d.). Technology improves students' educational experiences and gives teachers the tools to design engaging, adaptable learning environments. Artificial intelligence in education allows teachers to modify their lesson plans to accommodate different types of learners, improving both student engagement and learning outcomes. The way students learn and teachers instruct has undergone a radical transformation due to integration of technology and artificial intelligence into higher education. HEIs can better deliver individualized and exciting learning experiences by utilizing improved learning structures, virtual reality classrooms, and AI-enabled systems. The potential of these breakthroughs will continue to be fully unlocked as time passes, thanks to ongoing research and technological developments, which catapult higher education into a vibrant and learner-centered future.

Methodology

The systematic mapping approach advocated by Petersen et al. (2015) is used in this investigation. A systematic mapping survey technique classifies and quantifies the contributions made to a studied issue to give a thorough overview. It works well for studying a significant research topic since it enables a detailed investigation of research articles about a particular issue. Systematic mapping creates a thorough map of a more significant research topic than content-based analytical methods like bibliometric analysis, which quantitatively evaluates academic outlets within a specific research field (Farshchian & Dahl, 2015; Chen et al., 2020). On the other hand, bibliometric analysis focuses on assessing academic venues within a particular study topic. Three research questions (RQs) have been developed in the context of this study to investigate the potential implications of AI-enabled learning systems:

RQ1: What are the primary goals and driving forces behind research on gaining knowledge of environments using AI?
RQ2: What are the key troubles and issues, in addition to the recommended interventions and solutions, inside the region of AI-enabled mastering systems?
RQ3: Which conventional AI and information analytics strategies have been applied to the interventions?

A methodical mapping strategy was used throughout the research process to offer broad recommendations. Extensive searches that included formal and informal sources were done to accomplish the research objectives. Only studies published within the last five years were chosen to guarantee the usage of current research. A thorough mapping of the pertinent literature was done in the second step. To ensure impartiality, the systematic mapping process started with creating a search strategy based on a mapping technique. The research questions (RQs) were initially used to develop this technique, which was further honed for accuracy. Different search terms and strings, including alternative spellings and synonyms, were created to streamline the search results. Given that these phrases were frequently used interchangeably, the significant search terms "adaptive learning system" and "artificial intelligence" were employed, and database searches were carried out simultaneously. Alternate terms for adaptive learning systems include "adaptive learning environment," "adaptive learning platform," "adaptive learning technology," and "adaptive learning setting."

The terms "machine learning" and "artificial intelligence," which have broader meanings, were used interchangeably since discussions concerning adaptive learning systems that use AI frequently involve them. They cover more specialized methods like text mining and data mining. Boolean operations (AND and OR) combined these terms into a single search string, making it possible to include synonyms and other spellings. This strategy made sure that the literature on the subject was thoroughly examined.

Research Overview

51% of the papers covered have been published in scholarly publications, with the closing forty-nine% being convention papers gathered in conference lawsuits. Consistent with Wieringa et al. (2006), the articles were split into agencies based totally on the type of take-a-look-at technique used. The two most normally used research tactics were literature opinions (32 papers) and assessment research (forty-three courses).

Different AI-Powered Educational Initiatives

The research articles were divided into five categories based on the actual interventions and solutions used in AI-learning scenarios: systems, frameworks, models, methodologies, and combinations of interventions. Frameworks were discovered to be structured, hierarchical systems that explained presumptions, methods,

customs, concepts and instructions for implementing these definitions. Many of the frameworks suggested in the studies included vital elements and skills that might be used in educational settings. These frameworks suggested using user (learner) models, AI procedures, and other flexible methods as potential fixes.

These frameworks produced more adaptable learning environments by identifying and describing the links between diverse components. Various important tactics and procedures were found using the coding frameworks. Additionally, models were used in 22 research described by Stoica et al. (2015) as "a pattern of something to be made, an outline, or an analogy used to visualize and reason about the system to be developed and its likely outcomes."

These models fulfilled various functions, such as illustrating an experiment, a strategy for solving an issue, or a condensed version of a system or component that needed improvement. Some of these models needed to be rebuilt entirely to achieve their intended goals. Twenty study articles also looked into adaptable methods for treating diverse illnesses. An adaptive approach is a group of presumptions or viewpoints applied to recognize, define, and address issues resulting from certain phenomena. These adaptive methods show flexibility in addressing a range of learning-related problems. The categories of systems, frameworks, models, approaches, and combinations of interventions that have been discovered show the breadth and depth of interventions used in AI-learning scenarios, offering insightful information for developing the field of AI in education.

Instances of AI Learning Systems

The published papers focused on creating learning environments that used AI in various disciplines, including biology, computer literacy, psychology, nursing, and arithmetic. The identified languages taught in these applications are English, German, and Greek. These AI-integrated systems were also created to support language teaching and acquisition. These AI-enabled learning environments had two primary goals in mind. They first sought to improve teaching strategies, making them more efficient for various topic areas. Second, these settings were created to benefit English, German, and Greek students by assisting with language education and learning. These AI-integrated systems' overarching objectives included enhancing students' performance in all subject areas and tailoring learning opportunities to suit unique requirements and preferences. Researchers aimed to develop adaptable and responsive learning environments using AI technology, improving students' overall educational experiences. Those improvements had been developed as structures for handing over level-suitable, custom content material. Moreover, environments with AI integration are used to educate and study programming languages like Java and Square. The remaining themes are proven in desk 2.

Strategies for AI and Information Evaluation

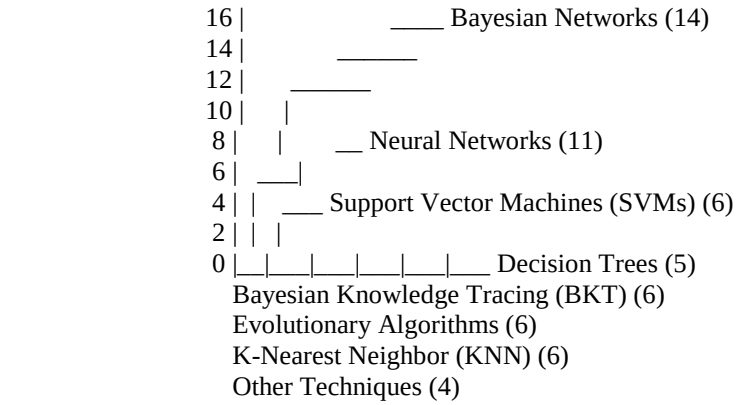

Figure 1. Frequency of AI and Records Analytics Techniques in Research Mapping

The frequency of each strategy identified in the research mapping is shown in the graph. With 14 papers relating to learning contexts facilitated by AI, Bayesian Networks were the most frequently cited technique. With 11 research articles mentioning it, neural networks came in second. The study mapping made six references to Support Vector Machines (SVMs), Bayesian Knowledge Tracing (BKT), Decision Trees, Evolutionary Algorithms, and K-Nearest Neighbor (KNN) approaches. Four study articles mentioned additional methods. Overall, Bayesian Networks and Neural Networks are the most widely used methods in the research, and the

graph gives an overview of the most frequently used AI and records analytics techniques in the context of AI-enabled learning settings.

Discussion

The study's objective was to assess the writings of diverse writers in light of these preset objectives. The research mapping highlighted numerous critical areas of relevance in AI-enabled learning systems. CorTexT network analysis was used to examine the connections between these topics. A co-occurrence matrix was used to cluster the papers, portraying each one as a tiny node and creating clusters based on the degree of author link. These groups were automatically identified and coloured using a clustering algorithm, which also assigned the labels "System," "Literature," "Algorithms," "Evaluation," and "Framework" to the diagram's central portions.

Most AI-enabled learning interventions concentrate on algorithmic, systematized, and framework-based methods. The majority of these commonly used frameworks and structures were still in the testing stage and had yet to be applied in actual classrooms. It was difficult for educational institutions to adopt these modalities of instruction because of the lack of practical application since it was only possible to thoroughly understand their advantages and disadvantages by assessing their efficacy in actual use.

There need to be more modern ways of learning that are AI-enabled and that deal with complex problems. Despite its potential, research on adaptive learning systems, particularly those leveraging modern AI approaches, could have been more impressive. Although there have been significant reviews of the literature, relatively few research have looked at the more complex issues that students face when using modern AI-enabled learning methodologies.

The bulk of systems for adaptive learning concentrated on teaching languages, programming languages, and other subjects, indicating that while they have potential, they have yet to be commonly employed. However, this field can have a research gap because these technologies might not always help users deal with difficult situations or require the requisite skills to use such systems correctly. Users may find it challenging to use these technologies to their full potential if unfamiliar. AI-enabled learning systems' handled issues were separated from those not thoroughly investigated using predetermined themes. This is a valuable tool for improving research in this field of study because it identifies gaps and potential research areas of interest.

The Implications of the Theory

The research work identifies knowledge gaps in the field of AI adaptive learning systems, particularly through literature reviews and observation analysis. This is a significant advancement over the previous studies that have been conducted. It was determined that there were significant holes in research in the following three areas:

Coincidences between the Authors and Their Research Subjects: This study provided a graphical representation of the links between the basic aims of the selected research and their authors. It also highlighted the primary ideas in the field of AI-enabled learning systems and how they are related to one another.

AI-enabled Learning Interventions and obstacles: The research found that instructors and students both confront a variety of obstacles in the environments in which they are engaged in learning. Problems with students' learning strategies, backgrounds, and profiles, as well as concerns regarding engagement and motivation, were included among these problems. (Dunn & Kennedy, 2019; Papamitsiou et al., 2018) The purpose of the study was to gain an understanding of the challenges that AI-enabled learning interventions have successfully overcome as well as the challenges that remain unsolved.

Applications of Analytics Methods in Learning Systems Using AI: The work primarily centered on analytics methodology and how various types of learning systems make use of various types of AI. It was discovered that the two types of analytics that were employed the most frequently were descriptive and predictive. The research highlighted various applications of these methodologies, such as improving students' academic performance and motivation, enabling personalized learning, assessing students' learning challenges, and detecting anomalies in student and lecturer behavior (Almohammadi et al., 2017; Wang et al., 2020; Aldowah et al., 2019; Manjarres et al., 2018; Wakelam et al., 2015). These applications were highlighted in the study. The research gives useful insights into the current status of AI-enabled learning systems, the obstacles they confront, and the possibility for improvement as well as ongoing research in this field by tackling these three essential areas.

Conclusion

The research findings emphasize the prevalence of adaptive learning systems, intelligent mechanisms, and AI-powered learning systems as the most frequently presented and utilized solutions for addressing challenges students and teachers face. Particularly during the pandemic, the significance of these systems has increased due to their contribution to maintaining solid educational standards and improving learning design in information technology and information systems education (Pappas & Giannakos, 2021). However, it is essential to note that despite their potential, most of the suggested systems and frameworks are still in the testing phase and have yet to be applied in real-world classroom settings or undergo rigorous evaluation. Many of these systems have yet to be fully developed.

The study highlights the potential widespread impact of AI-enabled learning systems and encourages higher education institutions (HEIs) to adopt these systems wherever possible. By synthesizing the latest discoveries in AI-enabled educational systems, the study significantly contributes to the existing body of knowledge and provides valuable insights into various related subjects. This mapping is crucial given the increasing research on AI-powered learning systems and their diverse applications for educational institutions, including universities.

The mapping can aid in selecting the most suitable AI-enabled learning intervention for specific challenges, facilitating more efficient management of educational systems. Future research should address unresolved issues and barriers preventing the broader adoption of AI-enabled learning systems in academic institutions. Bridging the knowledge gap between education and artificial intelligence (AI) is essential, and researchers should work on integrating course material, student expectations, and instructor requirements with various technological platforms. Investigating and implementing novel frameworks, models, and structures will be crucial in evaluating their effectiveness in helping students overcome learning obstacles. The research acknowledges its limitations, such as the impact of selected keywords, phrases, and databases on the extent of the mapping. Future research can explore more specific applications of AI, such as data mining or text mining, and delve deeper into the objectives and methodological approaches used in AI-driven learning systems.

In conclusion, the research underscores the significance of AI-enabled learning systems and advocates for continuous development and application of advanced frameworks to enhance the educational experiences of both students and teachers. By focusing on innovation and addressing research gaps, AI has the potential to revolutionize and optimize learning environments, paving the way for more effective and personalized education in the future.

Recommendations

The study offers helpful insights for practitioners looking to use AI-enabled learning systems in educational settings. The results show that systems and frameworks are the main topics of most AI-enabled learning interventions. Nevertheless, many suggested frameworks and systems are still experimental and must be ready for widespread usage. The ability to quickly distinguish between vital and particular information is one of the difficulties encountered in this domain. For instance, Padron Rivera et al. (2018) studied Tamaxtil. This AI-powered learning tool monitors students' affective states as they work through math problems in order to assist them in controlling their negative emotions. This example shows how AI-enabled learning systems might help students with trouble regulating their emotions during the learning process. It also emphasizes the necessity for future development and evaluation to ensure these technologies are efficient and valuable in educational settings. Practitioners interested in implementing AI-enabled learning systems should be informed about the latest developments and current research. They should carefully weigh the possible advantages and difficulties of implementing such systems and try to work with researchers to successfully address particular educational requirements. The study's findings emphasize the significance of rigorous testing and assessment to ensure the successful integration of AI-enabled learning interventions, providing helpful advice for practitioners wishing to leverage the power of AI in educational environments.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Foreign Language Learning in a Digital Environment - Results from a Primary Research

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Abstract: Education is a priority for all national economies. The current rapid changes are taking place in all areas of our lives. In today's globalised world, language skills, their development and their use at a skill level are essential. We all feel the need for renewal. Over the last two decades, technological factors such as computers, the games industry and the internet, as well as social factors like family, friends and society, have influenced the way children think and behave. Education is an area where innovation is needed for a number of reasons. It provides solutions to the challenges of the new age. For the digital natives of Generation Z, digital tools and methods have become part of everyday life. However, the introduction of innovation-related initiatives and methods is a complex and difficult process. Education professionals are still divided on digital education and digitally-enabled learning materials. The present study aims to present a picture of present student and teacher attitudes towards digital education.

Keywords: Digitalisation, Digital education, Innovation, Technology

Introduction

Teaching in virtual spaces is a phenomenon that affects and can impact all subjects. In this study, the learning and teaching of English is a particular area of focus. In different roles, we are confronted every day with the fact that students are more enthusiastic and have higher success factors in lessons based on digital learning materials. Digital learning materials, the various achievements of computing, provide users with an activity-based, mobile learning method. The study focuses on the teaching materials and methods used in foreign language learning.

Literature Review

Of these factors, rapidly evolving technology is the most dominant and effective (Varga, 2021). Technology-enhanced learning is seen by many as a potential and most relevant form of pedagogical innovation (Balanskat et al., 2006; Condie & Munro, 2007; Józsa & Steklács, 2009; Kozma & Anderson, 2002; Pelgrum & Anderson, 1999; Pelgrum & Voogt, 2007; OECD, 2006; Westera, 2004). This has made it inevitable that education and training also benefit from the potential of technology (Csiszárik Kocsir & Varga, 2017). Classical teaching methods and techniques are not enough for today's students, who are also known as digital natives. It is important to transfer and apply innovative teaching approaches and techniques to educational activities (Savaş et al., 2021; Savas et al., 2022). The role and purpose of the integral integration of technology in education is to facilitate the learning process and achieve efficiency (Smeets & Walraven, 2015; Buda, 2017). Digital competence and closely related digital intelligence (DI) are increasingly important in the education process (Drent & Meelissen, 2008). This kind of innovative change is indeed a complex process. Its complexity has led to a series of advantages and disadvantages (Coohalan, 2007). Two important components of education are

learners and teachers. The latter certainly need a change of attitude. The use of innovative methods and tools requires a flexible and open-minded approach (Lakatosné Torok & Kárpáti, 2009). Changes in students' attitudes towards learning, higher levels of motivation and improved concentration (Fegyverneki, 2017) can also be among the results of using digital tools. This generational transformation was contributed to by the unexpected change in the COVID situation in spring 2020, almost from one day to the next, with the introduction of digital education replacing face-to-face teaching. This extraordinary crisis has rewritten the history of education not only in our country, but worldwide. Although there had already been significant efforts in the US towards the introduction of an online space in education, in most countries it was a huge challenge for students and educators alike. In my view, this has been one of the main reasons for the now daily emergence of the topic of educational reform, also known as the latest stage of digitalisation.

Material and Methods

The problem tree drawn up prior to the study identified the significant difficulties currently encountered in the process of teaching a foreign language.

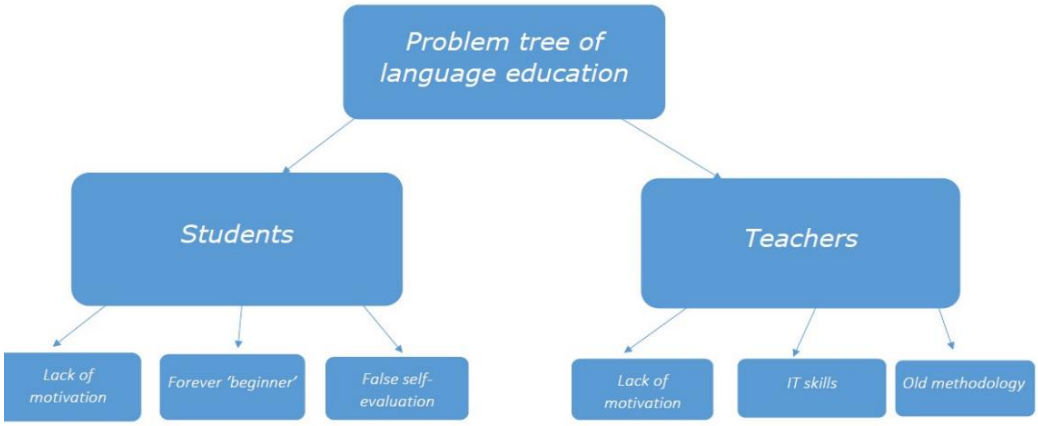

Figure 1. Problem tree for foreign language teaching

The main problems and weaknesses are related to the needs of Generation Z. In a rushing world, the need to be activity-oriented and immediately success-focused is no longer satisfied by long-established teaching methods. The pedagogical methods that teachers have been using to create the characteristics that the student community needs are no longer able to meet these needs. The hypothesis of this study is that the necessity and positive returns of digitalisation in education and the related reform of pedagogical methodology are relevant and urgent. Online questionnaires for students were used as a survey tool. The questions were structured around their learning attitudes, expectations and satisfaction with the foreign language. They were closed-ended questions. The aim was to find out what the students consider important in their foreign language learning, whether they prefer traditional language learning methods to new ones. Moreover to what extent they enjoy learning a language. A particular focus of the survey was to get an idea of their satisfaction with their language competences and their views on the use of ICT tools in the classroom. It was also important to know whether they have mobile devices and how familiar they are with their use and functions. The questionnaire also includes a question on their experience of online learning so far. Since the hypothesis of the study also relies on the attitudes of the educational actors, a survey questionnaire was also designed for teachers. In this, the questionnaire aims to shed light on the pedagogical methods currently used, their effectiveness and future possibilities. The analysis took place in January 2023 in three secondary schools in Germany, two in Turkey and one in Germany. The international and national research aims to shed light on the potential of digital education. There is a global consensus on the importance of foreign language learning and the need to adapt the way it is taught to the needs of the next generation of learners.

The study at international level is a priority, as the added value of the transnational dimension is indisputable. The target age group for the study is secondary school pupils in grades 9-13. All of them are members of Generation Z, so their answers are certainly usable and constructive. A total of 408 students participated in completing the questionnaires. The teachers participating in the survey, 21 in total, all teach a foreign language.

By analysing students' responses, their needs can be identified and made relevant. The use of new and "student-friendly" methods, digital literacy development should be part of our everyday work. 54.2% of respondents

expressed a need for this. We must be open to trying anything that can make our work with students more effective. Generation Z are all regular users of the digital space. They are integrating a variety of IT tools and virtual spaces into their lives at a very high level of proficiency. They have a demand for their everyday use. Their way of thinking makes it easier and more transparent for them to access learning materials through these tools and methods. Charts based on the responses are attached. Some prominent and inspiring results; 61.1% would like to learn a foreign language in a different kind of environment. Concerning the possibility of changing the method, 39.5% answered in the affirmative. It makes you wonder whether this is due to the fact that they have not encountered other methodological solutions? As the results of previous studies have already shown, a high percentage of Generation Z members own and regularly use an IT device, 69.4% also for learning purposes. It is interesting to note that when asked about the type of information they receive, the number of responses for ICT tools and paper-based resources was exactly the same - 39.5%. The question arises again, is this based on a lack of knowledge?

The questionnaires completed by teachers examined the frequency of ICT tools in their daily work and their level of skill in using them. 66.7% of respondents said they like using these tools and are happy to incorporate them into their daily work (61.9%). 81% agree that students are motivated and open to innovation. Regarding the questions on the effectiveness of digital tools, it can be seen that the teachers in the study consider them to be effective and definitely positive. They recognise (66.7%) that they are closest to the needs of Generation Z students. 71.4% believe that virtual space and digitalisation make lessons more colourful and enjoyable for students. Finally, I would like to highlight the 85.7% supportive opinion that the 'anywhere-anytime learning' opportunities provided by digital education are a given.

Results

The qualitative indicators include an increase in students' motivation to learn. In addition, there has been an improvement in teachers' motivation towards LLL (lifelong learning) as a methodological innovation and in their commitment to teaching. For a generation of students, the ability to use mobile applications is a source of pleasure and a sense of achievement. It is a well-known fact that our students enjoy playing games, especially with their mobile devices. This is an opportunity to achieve quality results.

Table 1. Results of the student questionnaire

STUDENT questionnaire	Yes %	I don't know%	No %
Is learning a foreign language important for your goals?	80,9	12,5	6,6
Do you enjoy learning English?	71,8	13,5	15,4
Do you expect learning a foreign language to be fun?	60,5	16	23,5
Do you think you could learn any foreign language under the right conditions?	61,5	23	15,5
Is there another way of learning English that is more effective than the one you are currently using?	47,8	39,5	12,7
Are you happy and satisfied with your speaking skills?	42,9	15	42,1
Do you like classes that focus on learning grammar?	37,7	15,5	46,8
Do you have a mobile phone?	96,3	0	3,7
Do you know how to use the features of your mobile device?	88,2	73,5	4,4
Do you use your phone to learn a foreign language?	69,4	7,8	22,8
Are you comfortable using technology in foreign language lessons?	74,3	15	10,7
Do you think it is better to get information through ICT than using printed materials?	39,5	39,5	21
Do you use ICT to communicate with international people on topics of personal interest?	54,2	20,3	25,5
Would you like to use ICT more often in language learning?	54,9	27,9	17,2
Do you like to learn/use foreign languages in your free time?	64,5	15,9	19,6

As a quantitative indicator, we can emphasise the mobile applications developed and the digitised learning materials. Incorporating this into everyday teaching and, from the students' point of view, into the everyday learning process, we can certainly expect results. By comparing the performance of groups of learners using digital applications and those working in a traditional framework, we will also be able to measure the results of the newly developed applications with quantitative indicators. As qualitative indicators, we can focus on the atmosphere and positive change in attitudes towards learning in a digital environment. All these will contribute

to our main goal of developing new innovative teaching environments and methods for learning. The quality of the new pedagogical methodological elements is demonstrated by the fact that users enjoy learning through play, while developing their different competences. Technical innovation is part of education, including English language teaching. Blended learning, virtual learning, gamification, extended language learning are all leading to innovations in the traditional teaching method. The responses from teachers show that there is an improvement in the opportunities offered by technological innovation. It is true that some of them are still in the adaptation phase according to the typology of Mioduser et al. (2003), but there is already a visible change in the practice used, as some of them are already at the assimilation stage (Forkosh Baruch et al., 2005). Indeed, there are even counter-examples. Curricula, teaching materials, teaching objectives and learning environments should be reformed. The earlier assertion that for some teachers only the so-called transition stage is visible, where ICT tools are used within the old traditional framework, seems to be refuted.

Previously, a number of Hungarian and international studies have confirmed that Hungarian teachers' work is characterised by a higher proportion of traditional methodological elements and tools (Kozma & McGhee, 2003; Mioduser et al., 2003; Law et al., 2003; Forkosh Baruch et al., 2005). In reviewing and analysing the results of the current study, we can see that, contrary to this assumption, many teachers are moving away from traditional pedagogical methods and are keen to incorporate new, innovative tools and methods into their everyday work. It is also important to note that the motivation and open-mindedness of teachers is clearly reflected in the results obtained. As the innovation of teaching methods is an integral part of the learning process, the link with the methodological training and innovation of teachers is also an integral part of digitalisation. Moving across the broader spectrum of education also opens up more opportunities for synergies between subjects. The quality of new, innovative practices and support for learning and teaching activities leads to a kind of mutual synergy in education.

Table 2. Results of the teachers' questionnaire (N=21)

TEACHER questionnaire	Agree %	Partly agree %	Don't agree %
Engaging in communicative activities is the best way to learn to use English more accurately.	76,2	23,8	0
I am comfortable using technology in English lessons.	66,6	33,3	0
I integrate mobile technologies to improve the teaching process.	61,9	23,8	14,3
I do not use the computer effectively in my teaching.	23,8	23,8	52,4
Students learn better and more easily in classes using computers.	23,8	66,6	9,6
Students learn less with computer-assisted learning than with other methods and techniques.	9,6	42,8	47,6
Computer-assisted learning is enjoyable.	71,4	23,8	4,8
I would like to use the computer in my lessons.	76,2	19	4,8
Children are motivated to use ICT.	52,4	42,8	4,8
ICT allows pupils to be more creative and imaginative.	81	19	0
Using ICT encourages pupils to communicate more.	52,4	38	9,6
Mobile learning provides immediate support for foreign language learning.	19	66,6	14,4
Mobile learning provides immediate support for foreign language learning.	52,4	42,8	4,8
Mobile devices enable students to learn anytime, anywhere.	85,7	9,5	4,8
I would install a foreign language learning app on my mobile phone	85,7	9,5	4,8

The main quality indicator of digital learning materials is the innovative curriculum itself and the innovative methodology that goes with it. Learner motivation, which comes from a curriculum that is closer to their thinking and interests, also falls into this category. If we look at how successfully learners and teachers work with a gamified curriculum, we can certainly identify another quality indicator. In fact, quality indicators reflect the declared objectives of renewal. The qualitative improvement in productive processes achieved through gamified learning also adds to the group of quality indicators. In any case, it should be stressed that the most important thing when creating digital curricula is to depart from the methodological elements used in traditional curricula. The characteristics of this new innovative method, as well as the tools and theories that help to make it effective, must be known by all those involved in the curriculum development process. Knowledge of methodological and technical tools is essential. It is very essential that digital rather than traditional teaching materials are used. The traditional role of the teacher is in practice completely transformed. The digital curriculum is an application that mediates learning content, as opposed to the programmed content of textbooks.

It uses mainly auditory and visual elements instead of written text. It is very necessary to take advantage of the opportunities offered by media integration. Changes include students working on screen instead of paper.

The results of digitalisation in education, both already existing and foreseen for the future, can clearly be seen as creative and innovative. Combined with older methodological elements used in the past, we can provide more enjoyable and effective learning for our students. As we can see from the results of the completed questionnaires, there is a generational problem in teaching with old methodological elements. Thus, we can build on innovative developments to solve these problems with digital applications. Innovative and effective teaching and learning is a key priority for schools and institutions. It is certainly a strength of the work of institutions to engage in processes that meet the needs of society and deliver results. The end product of this efficiency is indirectly produced in the labour market. Certainly for them, the methodological innovation that comes with the integration of digital tools is important and decisive.

The SWOT matrix illustrates the sustainability of the digitalisation process, showing strengths, weaknesses, opportunities and threats based on internal and external values. Strengths include our internal values that support and enhance the sustainability of our results. As in all sectors, our own institutions have weaknesses that need to be improved. This requires objectivity and critical thinking.

Table 3. Sustainability of digitalisation, Swot Matrix

	Positive factors	Negative factors
Internal values	STRENGHTS	WEAKNESSES
	Experienced teachers	Internet connection in schools
	Supportive school leadership	Colleagues stick to older methods
	Cross-sectoral and horizontal cooperation	Outdated technical tools
	Environmentally friendly implementation methods	Workload
	Realistic targets	
External values	OPPORTUNITIES	THREATS
	Training courses, conferences	Potential risks arising from parents' more
	Creation of digital databases	Difficult circumstances or unsupportive attitudes
	Digital supplementary material for textbook tenders	External and internal variables
	Contact with parents using digital tools	Difficult acquisition of equipment security

Conclusion

Digitalisation aims to modernise classrooms and innovative teaching methods. We need to integrate good practices and knowledge into teaching. In addition to these, the development of emotional intelligence, motivation, ICT, creativity, teamwork and cooperation, as well as tolerance, are given a prominent role. By creating an environment that supports learning, we can make the learning process attractive and effective. By complementing subject development, we can encourage learner autonomy and self-evaluation. Digitalisation places the curriculum in a new, youthful, creative and environmentally friendly environment. Our students can use their everyday IT devices such as mobile phones and tablets. All these tools are already being used at a skill level. So they are familiar with the experience of apps and learning materials embedded in games. In summary, one of the most important outcomes of digitalisation is the creation of an experiential learning process in an innovative environment, using new methods. Teachers' attitudes towards the use of new tools have shifted in a positive direction. For students, this can certainly ensure a more effective and efficient learning process.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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A SEGE-Based Investigation on Women-Friendly Practices of Municipaties

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Abstract: Cities, which have the characteristic of being a social space, have turned into main centers where inequalities arising from gender roles are experienced over time. However, all individuals living in cities should use public space equally, benefit from the tools of democracy, and behave equally in terms of participation and representation. In most civilized countries where women and men have equal conditions in urban life within the framework of acquired legal rights, these are guaranteed by law. However, the rules determined in this legal framework and the application area do not progress in parallel. Especially in municipalities that provide urban services, it has been a frequently discussed topic that has been criticized from various perspectives, such as the neglect of women's services, the limited representation of women, and the fact that women are not taken into account in the design of public spaces. In the face of these criticisms, municipalities have tried to tolerate the negativities by increasing the 'women-friendly' practices. In the framework, the prepared study aims to identify the 'women-friendly' practices of municipalities in Turkey. In the study, the document analysis method, one of the qualitative research techniques, was used. In line with this, the 'women-friendly' practices of the cities in the upper, middle and lower developed levels were investigated through the annual report, based on the SEGE index, which shows the development level of the provinces in Turkey. Yalova as the city at the upper level, Afyonkarahisar as the city at middle level, and Kars as the city at the lower level were chosen as the sample and wore the subject of the research. The activity reports of the municipalities responsible for the management of urban-public services in these cities were scanned, analyzed and the findings were presented in tables.

Keywords: Urbans, Municipalities, Women, Women friendly, SEGE.

Introduction

Gender is an innate characteristic. This innate condition is a biological phenomenon and is expressed as gender. The behaviors, attitudes and roles of biological sexes are formed as a result of social and cultural processes. In other words, beyond the characteristics of biological sex, it is a phenomenon that changes on the axis of social and cultural structures. Babies born as girls or boys turn into 'women' and 'men' as a result of many things that happen to them in the world. This is the result of a social gender regime and cannot be described as a simple socialization. As a result of this regime in some societies, it is seen that basic problems such as deepening inequalities between women and men in society, the formation of spatial differentiation specific to women or men in the public sphere, and injustices in the participation of women and men in administrative and political mechanisms have emerged. However, as a requirement of human rights, the protection of social order and gender equality is of critical importance. For this reason, human rights are based on the idea of equality and it is underlined that men and women should be equal in social life. The Universal Declaration of Human Rights

states that "all human beings are born free and equal in dignity and rights. Everyone is entitled to all the rights and freedoms proclaimed in the Declaration without distinction of any kind, such as race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status" (UN, 2022). From this point of view, it has become a basic expectation in developed countries as a fundamental policy objective to create social life according to the needs/preferences of women and men and in a way that promotes gender equality. In this context, local governments, where democracy, participation and egalitarian practices are closely felt, have become critical for achieving the goals set at a higher scale. Municipalities, one of the local government units that provide public services at the local level, are autonomous government units whose decision-making bodies are elected in many countries and are necessary for a democratic social order. Accordingly, municipalities are expected to create mechanisms of equality in every sense.

In this context, this study aims to analyze the 'women-friendly' practices of municipalities in Turkey. In Turkey, municipalities are administrations that are elected by all citizens of the city to meet the localized needs of the citizens of the city in the urban area and undertake the responsibility of providing effective, efficient and effective urban services within the legal term of office. In Turkey, the 1982 Constitution and local government legislation clearly stipulate equality between men and women. This equality is also guaranteed for urban citizens. The functionality of this legally guaranteed situation in practice was investigated by analyzing the annual reports of municipalities responsible for the management of urban-public services. Document analysis method, one of the qualitative research techniques, was used in the research. Accordingly, based on the SEGE index, which shows the development level of provinces in Turkey, the 'women-friendly' practices of Yalova, Afyonkarahisar and Kars, which are located in the upper, middle and lower developed levels respectively, were scanned, analyzed and the findings were presented in tables.

Sex, Gender and Gender Equality

Men and women were not physically and biologically equal. This difference is an innate characteristic and is conceptualized as 'gender'. The concept of gender is a concept used to describe the biological, physiological and genetic dimensions of an individual's being a woman or a man. This innate difference is shaped over time on the axis of social and cultural values and different roles, patterns or attitudes are assigned to 'women' and 'men'. Various preferences such as clothes, colors, toys and the behaviors and attitudes that the child will be asked to be a member of throughout his/her life are constructed by the child's family, close environment and/or the society in which the child is born. As a result of this process, which is not innate like biological sex, different roles, attitudes and behaviors are assigned to 'women' and 'men' by the society. This situation is called gender. The concept of gender was introduced to the feminist literature by sociologist Ann Oakley in 1972 and its use has become widespread over time (Ecevit, 2021). In this direction, the concept of gender can be defined as "The concept of gender can be defined as the basic duties and responsibilities associated with the biological sex that people acquire at birth and given by society" (Tapdık, 2020). Keller (2007) defined gender as "a cultural category that describes the shared beliefs of a particular culture about what is masculine and what is feminine, and refers to this set of beliefs as gender ideology". While the concept of "sex" refers to the biological differences between men and women, the concept of "gender" defines the social relations between men and women, emphasizing the relationship between men and women and how this relationship is socially constructed. Therefore, gender roles are dynamic and their content changes according to time and place (Kadının Statusu Genel Mudurlugu, 2008). Gender equality is defined as equal rights, participation, visibility, empowerment, empowerment, representation and equal and fair participation in all aspects of social life without being discriminated against because of their gender, which is a characteristic that individuals do not choose and whose emergence is controversial (Ercan, 2022).

Table 1. The difference between biological sex and gender (Sargın, 2013, p. 6)

Biological Gender	Social Gender
It is innate	Learned later
It is related to reproductive functions	It is related to social roles
Universal	It differs from society to society and over time
	Can be changed

Equality is the creation of a social environment in which individuals can fully and freely develop all their talents and the elimination of all social and political obstacles to this environment. Inequality, on the other hand, is a difference that is unnecessary and at the same time unfair because it is preventable and avoidable. For this

reason, differences between men and women arising from their genetic, physiological and biological characteristics are not considered within the framework of inequality. Gender inequality means any discrimination, deprivation or restriction that prevents women from recognizing, exercising and enjoying their human rights and fundamental freedoms in political, economic, social, cultural and civil spheres (Demirgoz Bal, 2014).

Gender Equality in Municipalities and Women Friendly City

Today, cities are social settlements where the majority of people live together. The main actors generally responsible for providing urban services in these settlements are municipalities. Since they are the closest service provider unit to the public, municipalities have an important place in the implementation of policies determined at both macro and micro levels. Cities, where services are provided by municipalities, are spaces that host individuals of both sexes. Cities, which have the characteristics of being a social space, have turned into the main centers where inequality arising from gender roles is experienced. However, all individuals living in cities should equally use public spaces, benefit from the tools of democracy, and be treated equally in terms of participation and representation. In most civilized countries where women and men have equal conditions in urban life within the framework of acquired legal rights, these rights are guaranteed by law. However, the rules set out in this legal framework do not progress in the same way in practice.

Municipalities, a unit of local government, are administrative structures consisting of representatives elected by the people living in a particular district or region. Considering both the world population and the population distribution of settlements, it is seen that the number of women and men is close to each other. Therefore, it is expected that women and men should be represented in close proportions in both local governments and municipalities. Despite constituting half of the urban population, women are not fully and equally represented in local decision-making processes. However, women are natural partners that elected and appointed local administrators should include in planning and management processes (Tekinbas, 2015). The representation rates of women in elected local political bodies in the world are shown in Figure 1.

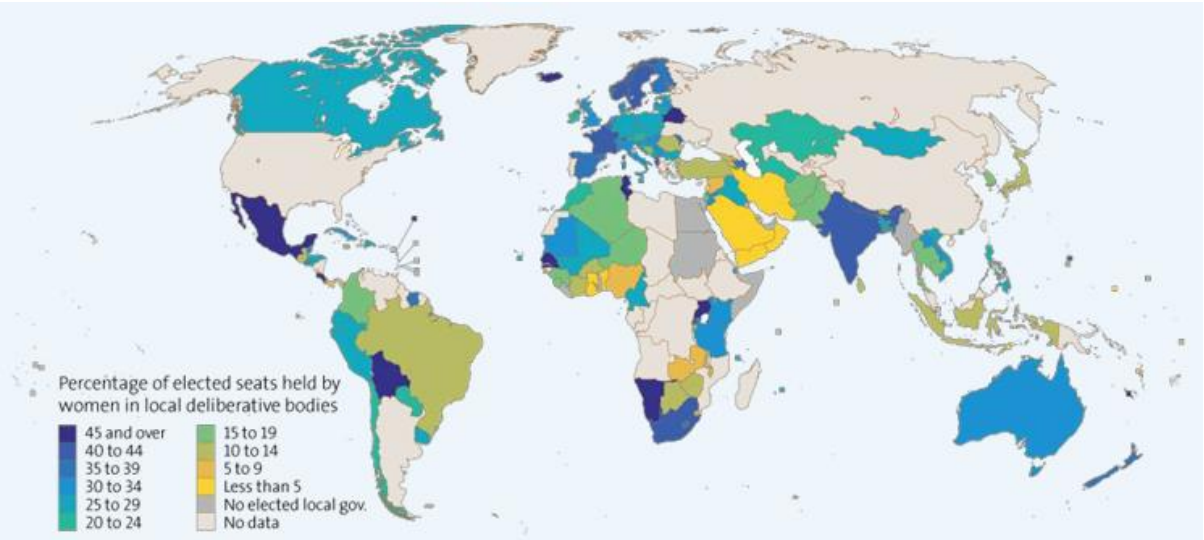

Figure 1. Representation of women in elected local political bodies in the world (Berevoescu & Ballington, 2021, p. 6)

Inequality between women and men is not only experienced in terms of women's representation. Urban planning is traditionally carried out by men and women's needs are often not taken into account. However, local decisions taken in areas such as housing, security, transportation, education and health directly affect women, making their lives easier or more difficult. It is sometimes observed that the design of urban space creates an environment that excludes women from social life. This situation has also attracted the attention of feminist geographers. Sassen (2015) stated that "urban planning is not gender neutral". In this context, one of the main reasons for inequality in urban life is that cities are designed by men for men. In this respect, it is thought that local governments, which hold the power of urban planning in their hands in the organization, management, policy formulation and implementation of urban planning, act on the axis of patriarchal values that ignore, marginalize or subordinate women (Alkan, 2022). Unlit streets, rundown neighborhoods, dead-end streets, areas with limited transportation networks and areas lacking security create the perception in women's minds that

various areas of the city are risky or insecure, leading to the restriction of these areas of the city for women; leading to a sense of fear and anxiety. Women are also one of the groups least able to benefit from cultural, sports and recreational opportunities in cities. In the planning and organization of the city, the creation of spaces where women can come together, the establishment of a nursery or day care center in every neighborhood and similar services are generally not seen as priorities. The distinction between the private and public spheres that emerged as a result of all these has embedded the idea that 'a woman's place is at home' in the social structure. While women are isolated from the public sphere and undertake household chores such as cleaning, cooking, childcare and elderly care, men assume the role of the father who works and looks after the home. The city, divided into public and private spheres, has been an obstacle to women's participation in socio-economic life and politics (Safak, 2021).

In conclusion, it is desirable and expected that urban/local municipalities develop policies sensitive to gender equality. This expectation is fed by both international and national legal texts binding local governments. One of the most important legal limits binding the urban services provided by municipalities was the "rights of the urban dweller" at the meeting of the European Conference of Local and Regional Authorities in Strasbourg in 1992. In this text, which is a twenty-point declaration, it is emphasized that local governments and therefore municipal services should be egalitarian. Apart from this, there are also binding texts for local governments/municipalities such as the 'Council of European Municipalities and Regions (CEMR) European Charter on Equality of Women and Men in Local Life', as well as texts such as the 'Universal Declaration of Human Rights' and the 'CEDAW Convention'. Turkey has implemented many international and national legal regulations to ensure that local services are provided equally to urban dwellers. However, the practice of democracy and representation of municipalities, which are the closest service units to the people, in terms of planning and use of the city, and the equal and fair provision of urban public services is a controversial issue for the individuals living in the service area, especially women.

With the recent acceleration of the current debates, municipalities, which are at the center of criticism, are trying to implement women-friendly practices. Women-friendly cities are 'cities that support women's equal participation with men in all areas of urban life by ensuring women's access to health, education and social services, employment opportunities, quality, comprehensive urban services (transportation, housing, security, etc.), mechanisms to secure their rights in case of violence, and their participation in the planning and decision-making processes of local governments' (Esitlik Adalet Kadın Platformu, 2019). The ability of a city to be a women-friendly city is closely related to its ability to accurately identify the problems and needs of women living within its borders and to take the necessary measures to eliminate all forms of discrimination against them.

A Research on Women Friendly Practices of Municipalities in Yalova, Afyonkarahisar and Kars Provinces

Information on Research Cities

Yalova ranked 12th in the "Socioeconomic Development Index Ranking of Provinces (SEGE)" prepared by the Ministry of Development. Yalova, which is located in a dominant position in the middle of three major metropolises such as Istanbul, Kocaeli and Bursa, is constantly developing and growing with the advantages of its geostrategic location and high accessibility opportunities (Ozkan, et al., 2020). According to 2021, Yalova's population is 291,001. 90.15% of this population lives in the city. The population consists of 145,740 men and 145,261 women. In percentage terms, 50.08% of the population is male and 49.92% is female (TUIK, 2022). The high level of education of the people living in Yalova is one of the first striking features of the city, and the female literacy rate is 95.6%, which is above the average in Turkey (T.C. Sanayi ve Teknoloji Bakanlıgı, 2019). While the male literacy rate is 99.1%, the female literacy rate is 95.6%. 34% of the population is young, 48% is middle-aged and 18% is elderly (TUIK, 2022). While the urban population rate is 73.3%, the rural population rate is 26.7% (T.C. Yalova Valiligi, 2023). Yalova is in a very good position in terms of women's employment across Turkey, and has the distinction of having the second female governor in Turkey's history (TRT Haber, 2023). On the other hand, the city is weak in terms of civil society and women's representation in CSOs is also low. In the 18-member provincial general assembly, no women are represented. Similarly, the majority of the employees of the city council and public institutions in the city are predominantly men. As can be seen, while there is an equal demographic distribution between men and women in the city, women have not been able to participate in the city at the same level in terms of representation, working life and social participation.

Afyonkarahisar lags behind the provinces in the region in terms of socioeconomic development. In the "Socioeconomic Development Index Ranking of Provinces (SEGE)" prepared by the Ministry of Development 41 ranking, Afyonkarahisar has the image of a traditional, conservative, introverted, underdeveloped, clean, calm, cheap city (Ozdemir & Karaca, 2009). Looking at the demographic structure of Afyonkarahisar, the total population of the province is 744,179. Of this population, 371,421 are male and 372,758 are female. In other words, 50.01% of the population consists of women (TUIK, 2022). There are 110 central neighborhoods in Afyonkarahisar. Among the mukhtars serving in the central neighborhoods, the mukhtars of only 4 neighborhoods are women. When we look at the municipal council, only 3 of the 31 members of the municipal council are women. Similarly, only 4 of the 50 members of the provincial general assembly are women. Similarly, the majority of the employees of the city council and public institutions in the city are predominantly men. As can be seen, while there is an equal demographic distribution between men and women in the city, women have not been able to participate in the city at the same level in terms of representation, working life and social participation.

Kars is included in the "Socioeconomic Development Index Ranking of Provinces (SEGE)" prepared by the Ministry of Development in terms of socioeconomic development. It ranks 69% and is among the sixth tier developed provinces. The population of Kars in 2022 is approximately 274,829 according to the Turkish Statistical Institute data. When the population structure of Kars is analyzed, it is seen that the proportion of young population is quite high. In Kars, the ratio of males to the population is higher than that of females. The ratio of female population is 49.80%, while the ratio of male population is 51.20% (TUIK, 2022). Kars has 23 central neighborhoods and 73 villages. Among the mukhtars serving in the central neighborhoods, only 2 mukhtars are women. In the municipal council, only 3 of the 25 members of the municipal council are women. There are no women among the 21 members of the provincial general assembly.

Purpose and Method of the Study

The study aims to examine the 'women-friendly' practices of municipalities in Turkey based on the concept of 'women-friendly city', which is intensively discussed by different disciplines today. In line with this purpose, the strategic plans and annual reports of the municipalities in the upper, middle and lower developed levels according to the SEGE index, which indicates the development levels of the provinces in Turkey, and their 'women-friendly' practices were investigated. Yalova as a high-level city, Afyonkarahisar as a middle-level city, and Kars as a low-level city were selected as samples and analyzed for the purpose of the study.

Document analysis method, one of the frequently used qualitative research methods, was used in the study. Providing data by analyzing written documents containing information about the facts and events related to the subject examined within the scope of the research is called document analysis (Seyidoglu, 2016). This method provides researchers with the opportunity to conduct an in-depth analysis and draw conclusions based on existing sources. In this study, document analysis method was used to determine the women-friendly practices of municipalities. In light of the relevant method, the strategic plans and annual reports of the municipalities selected as the sample were used for document analysis, as they contain detailed information on the urban and public services of the municipalities. The method scheme of the study is shown in Figure 2.

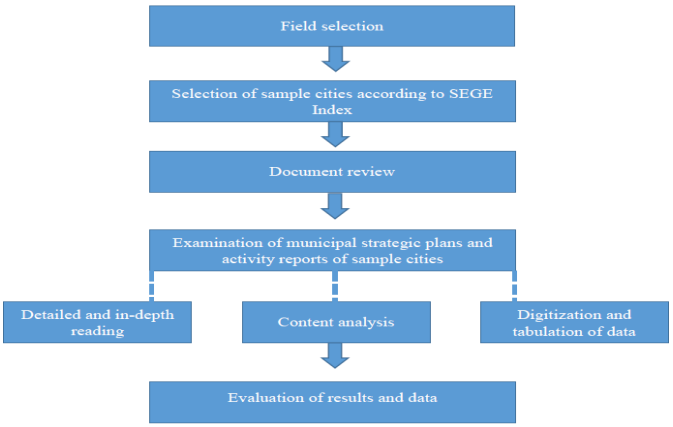

Figure 2. Method schematic

The first step of the study is to scan the strategic plans and activity reports of the relevant municipalities. These reports include issues such as how much importance the municipalities attach to women's services, the

representation rate of women, whether women are taken into account in the design of public spaces, etc. In the document analysis process, the data obtained from the scanned activity reports were analyzed. In this analysis, information on women-friendly practices of municipalities was summarized and tables were created for comparison. As a result of the analysis, findings were obtained on women-friendly practices of municipalities in Yalova, Afyonkarahisar and Kars, which are located in cities with high, medium and low levels of development. These findings evaluate the performance of municipalities in ensuring equal conditions for women in urban life and implementing women-friendly policies.

Findings of the Study

In the sample of Yalova, Afyonkarahisar and Kars, the number of women-focused activities, goals and targets were calculated by looking at the strategic plans of the cities and their ratio in terms of the total number of goals and targets is presented in Table 2. Again, the two data included in the table are YEAP and GEEPS. In 2006, CEMR developed the "European Charter for Equality between Women and Men in Local Life", which is both a political document and a practical tool for all segments of society to benefit equally from services at local and regional level in Europe. The instrument promotes citizen participation in the planning, implementation and monitoring of municipal services. It emphasizes that different segments of society may have different needs and that the municipality should shape its services accordingly, and considers this on the basis of human rights (TBB, 2021). Among 35 municipalities, only Kars is among the signatories. The LEAP constitutes the framework for local equality policies. Local Equality Action Plans aim to realize equality between women and men at the local level and to embed a gender approach into local governance in order to make equitable policies sustainable. Local Equality Action Plans, also referred to as equality roadmaps of cities, include strategies to increase women's participation in local decision-making processes and decision mechanisms, improve their daily living conditions, and local service models that will ensure the implementation of these strategies (Sabancı Vakfı, 2023).

Table 2. Analysis of policy documents[1] (Strategic plan, KEES ve YEEP) (Afyonkarahisar Municipality, 2023; Yalova Municipality, 2023; Kars Municipality, 2023; İzleme.org, 2023).

Cities	Total Number of Objectives	Total Number of Targets	Number of Objectives for Women	Number of Targets for Women	KEES	YEEP
Afyonkarahisar	4	18	0	0	-	-
Yalova	8	26	0	0	-	-
Kars	8	27	0	0	+	+

The percentage value was calculated by proportioning the number of women-focused, women-themed NGOs among the existing NGOs in the cities. The data obtained are presented in Table 3.

Table 3. Ratios of women-focused associations to the total number of women-focused associations in cities [2]

Cities	Number of Women Associations	Total Number of Associations	Ratio of Women Associations (%)
Afyonkarahisar	17	1138	1,49
Yalova	18	452	3,98
Kars	4	196	2,04

Tablo 4. Rates of women representation in local assemblies in cities

Cities	Municipal Council		Provincial General Assembly		City Council	
Afyonkarahisar %.12,55	3 Woman %9,67	28 Man	4 Woman %8	46 Man	3 Woman %20	12 Man
Kars %10,25	3 Woman %12	22 Man	0 Woman	21 Man	3 Woman %18,75	13 Man
Yalova %12,04	5 Woman %16,12	26 Man	0 Woman	18 Man	3 Woman %20	12 Man

[1] The researcher examined the 2019-2023 strategic plans of the municipalities by obtaining them from the website and created a table. SEEAP and REAP data were obtained from https://www.izleme.org/category/yeepler/

[2] Data on associations were officially obtained by the researcher from the Ministry of Internal Affairs.

In Afyonkarahisar, the representation of women in the Municipal Assembly is 9.67%, in the Provincial General Assembly 8% and in the City Council 20%. According to these data, the majority of those working in local representation mechanisms in Afyonkarahisar are men. In other words, the representation of women in local government mechanisms is quite limited.

In Kars, the representation of women in the Municipal Assembly is 12%, in the Provincial General Assembly 0% and in the City Council 18,75%. According to these data, the majority of those who take part in local representation mechanisms in Kars are men. In other words, the representation of women in local government mechanisms is quite limited.

In Yalova, the representation of women in the Municipal Assembly is 16,12%, in the Provincial General Assembly 0% and in the City Council 20%. According to these data, the majority of those who take part in local representation mechanisms in Yalova are men. In other words, women's representation in local government mechanisms is quite limited. When we combine all the data, the final Table 5 below shows the situation of women's participation in the public sphere in these cities.

Table 5. Women's visibility in women-friendly cities

Cities	Representation	Policy Documents	NGO	KDK (YEEP, KEES)
Afyonkarahisar	%12,55	0	%1,49	0
Yalova	%12,04	%17,64	%3,98	0
Kars	%10,25	%5,71	%2,4	100

When we look at the situation with quantitative indicators of women in these cities, which have taken steps to become women-friendly and have carried out a series of activities, we can say that the issue of "equality" has not been realized in the political, administrative and civil spheres. This situation suggests that women's equal presence in the public sphere has not yet been realized even in the cities included in the CSW project.

Afyonkarahisar Municipality

When the 2020-2024 strategic plans of Afyonkarahisar Municipality were examined, it was seen that a total of 4 goals and 18 objectives were included. However, when these goals and objectives were analyzed, no findings on women-friendly practices were found (Table 6). The strategic plan also mentions the necessity of women's participation in the labor force and the inadequacy of women's employment in Afyonkarahisar. Despite this, when the number of municipal personnel is analyzed, it is seen that women are not even employed in the municipality (Table 7). Of the 366 employees employed in the municipality, only 58 are women.

Table 6. Number of objectives and targets of Afyonkarahisar municipality(Afyonkarahisar Municipality, 2023).

City	Total Number of Objectives	Total Number of Targets	Number of Objectives for Women	Number of Targets for Women
Afyonkarahisar	4	18	0	0

Table 7. Distribution of Afyonkarahisar municipality personnel by gender (Afyonkarahisar Municipality,2023)

Cinsiyet	Civil Servant+Contracted Personnel	Worker	Total
Woman	24	34	58
Man	248	60	302
Total	272	94	366

In Afyonkarahisar, the representation of women in the Municipal Assembly is 9.67%, in the Provincial General Assembly 8% and in the City Council 20%. According to these data, the majority of those working in local representation mechanisms in Afyonkarahisar are men. In other words, the representation of women in local government mechanisms is quite limited.

In Kars, the representation of women in the Municipal Assembly is 12%, in the Provincial General Assembly 0% and in the City Council 18,75%. According to these data, the majority of those who take part in local representation mechanisms in Kars are men. In other words, the representation of women in local government

mechanisms is quite limited. When the data obtained from the Ministry of Interior are analyzed, it is seen that Afyonkarahisar has more public service areas than the other two cities (Table 8). According to the data obtained from the Ministry, it is possible to say that there are 26 kindergartens and 13 children's homes, 6 nursing homes, 5 disabled care centers and 1 women's guesthouse in Afyonkarahisar (Table 8). In the 2020-2021 activity report of Afyonkarahisar Municipality, it has been determined that there is 1 activity under the title of education for women, 2 activities for employment/economic activities and 1 activity in the category of other services. Emphasis on participation, shelter/ violence and equality are also not included in the activity reports. Detailed data is shown in Table 9.

Table 8. Number of public service areas in Afyonkarahisar [3]

City	Nursery	Nursing Home (ASHB)	Nursing Home (Private)	Women's Guesthouse	Disabled Care Rehabilitation Center. (ASHB)	Disabled Care Rehabilitation Center (Private)	Children's Home
Afyonkarahisar	26	6	1	1	1	4	13

Table 9. Women-focused objectives in afyonkarahisar annual reports(Afyonkarahisar Municipality, 2023)

Education	Employment/Economy	Participation	Shelter/Violence	Emphasis on Equality	Other Services
*Women's Cultural Houses aim to provide education for housewives and socialize them at the same time.	*Women offered their handmade products for sale in the "Marifetli Eller Pazarı" organized within the scope of Women's Day activities. *The products produced within the scope of the project, which includes making cloth dolls, are intended to add value to the economy of women and the city.				*The Ladies' Lodge, which started operating in 2014, provides social and cultural services to women.

Yalova Municipality

When the 2020-2024 strategic plans of Yalova Municipality were examined, it was seen that a total of 8 goals and 26 objectives were included. However, when these goals and objectives are analyzed, again, as in the city of Yalova, there is no evidence of women-friendly practices (Table 10).

Table 10. Number of objectives and targets of Yalova municipality (Yalova Municipality, 2023)

City	Total Number of Objectives	Total Number of Targets	Number of Objectives for Women	Number of Targets for Women
Yalova	8	27	0	2

The strategic plan underlines the objective of 'Providing social support and assistance to disadvantaged social segments within the framework of social municipalism practices'. However, this target mentions practices for the elderly and children rather than activities for women. When the personnel numbers of Yalova Municipality are analyzed, it is seen that only 302 of the 1151 employees are female (Table 11). It is understood that approximately 77% of the personnel working in Yalova Municipality are men. While the municipality emphasizes social support and assistance, it is seen that it is unable to ensure equality between women and men in employment within its own organization. When the data obtained from the Ministry are examined, it is possible to determine that there are 11 kindergartens and 8 children's homes, 3 nursing homes, 5 disabled care centers and 1 women's guesthouse in Yalova (Table 12). In Yalova Municipality's 2020-2021 activity report, it

[3] The data presented was obtained from the Ministry of Interior within the scope of the project.

was determined that there is 1 activity for the title of education for women, 2 activities for shelter/violence, 1 activity on equality emphasis and 1 activity in the category of other services. Employment/economic and participation are also not included in the activity reports. Detailed data is shown in Table 13.

Table 11. Distribution of Yalova municipality personnel by gender (Yalova Municipality, 2023)

Gender	Total
Woman	302
Man	849
Total	1151

Table 12. Number of public service areas in Yalova [4]

City	Nursery	Nursing Home (ASHB)	Nursing Home (Private)	Women's Guesthouse	Disabled Care Rehabilitation Center. (ASHB)	Disabled Care Rehabilitation Center (Private)	Children's Home
Yalova	11	2	1	1	2	3	8

Table 13. Women-focused objectives in Yalova annual reports

Education	Employment/ Economy	Participation	Shelter/Violence	Emphasis on Equality	Other Services
* It is aimed to start sports, skills and vocational courses for women, children, children and people with disabilities and to create production workshops, to provide basic education support in Turkish, Mathematics, English etc. for primary and secondary school level.			*Opening women's solidarity centers (providing psychological, legal and social services to disadvantaged women). *In the Therapy Room organized at the Bahçelievler Yasmek Center, psychological counseling and therapy process was carried out with mostly women and young clients experiencing domestic violence, communication in the family, relationships, suicide attempts and various psychological problems.	*Yalova Municipality aims to be with our citizens throughout their lives by attaching importance to the perspective of Social Municipality and Social Services, and to ensure that all of them benefit equally from all the opportunities of the city, regardless of their social, economic and cultural differences.	* Family counseling services were provided to strengthen family ties. *At the end of the project, which was implemented for the first time by the Women and Family Directorate under the slogan "A Breath for Mothers, Happiness for Children", children completed the summer school covering a period of one month.

Kars Municipality

When the 2020-2024 strategic plans of Kars Municipality were examined, it was seen that there were 8 objectives and 27 targets in total (Table 14). It is understood that 2 of these objectives are for women. These objectives are grouped under the main headings of 'Empowering women economically and socially, mainstreaming social equality perspective in municipal services'. When the number of personnel in the municipality is analyzed, it is seen that only 132 of the 888 employees are women (Table 15). When the data obtained from the Ministry are examined, it is possible to determine that there are 5 kindergartens and 8

[4] The data presented was obtained from the Ministry of Interior within the scope of the project.

children's homes, 1 nursing home, 1 disabled care center and 1 women's guesthouse in Kars province (Table 16). According to these data, there is a lack of public services that address women and are necessary for women's participation in both social and economic life in Kars. In the 2020-2021 activity report of Kars Municipality, it was determined that there is 1 activity under the heading of employment/economy for women, 2 activities for shelter/violence and 1 activity under the category of other services. Emphasis on education, participation and equality is also not included in the activity reports. Detailed data is shown in Table 17.

Table 14. Number of goals and objectives of Kars municipality (Kars Municipality, 2023)

City	Total Number of Objectives	Total Number of Targets	Number of Objectives for Women	Number of Targets for Women
Kars	8	26	0	0

Table 15. Distribution of Kars municipality personnel by gender (Kars Municipality, 2023)

Gender	Civil Servant+Contracted Personnel	Worker	Subcontractor	Şirket Company	Total
Woman	23	14	14	81	132
Man	92	72	152	440	756
Total	115	86	166	521	888

Table 16. Number of public service areas in Kars [5]

City	Nursery	Nursing Home (ASHB)	Nursing Home (Private)	Women's Guesthouse	Disabled Care Rehabilitation Center. (ASHB)	Disabled Care Rehabilitation Center (Private)	Children's Home
Kars	5	1	0	1	1	0	8

Table 17. Women-focused objectives in Kars annual reports (Kars Municipality, 2023)

Education	Employment/Economy	Participation	Shelter/Violence	Emphasis on Equality	Other Services
	*It is aimed to provide vocational training services.		*All parks and gardens, overpasses and bridges in the city center were inspected in terms of women, children and disabled people due to the requirement to make the city safer for women, which is among the activities of the Provincial Action Plan on Combating Violence against Women. *With the Women's Solidarity Center Women's Support Line, women citizens who contacted the line were directed to the relevant directorates and institutions in line with their problems and demands.		*Women's Solidarity Center and Community Solidarity Store were established. *Women and Family Health Services *Home Health Services *1 Women's Life Center was established. *1 day care center (nursery) was established.

[5] The data presented was obtained from the Ministry of Interior within the scope of the project.

Conclusion

In its shortest definition, gender equality means that women and men have equal rights and opportunities in society. However, equal provision of services and elimination of gender discrimination in urban areas are not always realized successfully. This study examines women-friendly urban practices offered by municipalities from a gender equality perspective. The impact of municipalities' urban services on gender equality and the challenges and discrimination faced by women in urban life are analyzed. The strategic plans, activity reports and practices of municipalities are reviewed, and the inadequacies of women-friendly urban practices are identified.

- In the cities examined in the research area, facilities such as kindergartens, retirement homes and women's guest houses that can eliminate the disadvantages of women's lives are not sufficient according to the population.
- In the Strategic Plan of Afyonkarahisar Municipality, there are a total of 4 Objectives and 18 targets; among these objectives and targets, the titles "activities to ensure gender equality" and "egalitarian women's policies" were not found.
- Yalova Municipality's Strategic Plan has a total of 8 Objectives and 27 targets; among these objectives and targets, there are 2 targets that can be evaluated under the titles of "activities to ensure gender equality" and "egalitarian women's policies".
- Kars Municipality's Strategic Plan has a total of 8 Objectives and 26 targets; among these objectives and targets, there are no targets under the headings of "activities to ensure gender equality" and "egalitarian women's policies".

The study reveals that women's employment is low in the cities studied and women's opportunities to work in municipalities are limited. This situation shows that there is a lack of gender equality. In addition, it was found that there are insufficient facilities such as kindergartens, retirement homes and women's guest houses that can facilitate women's daily lives. This creates obstacles to women's participation in social life and labor force. Especially in the strategic plans of Afyonkarahisar and Kars Municipalities, there are no targets or objectives for gender equality and egalitarian women's policies. This shows that women's rights and gender equality issues are not among the priorities of the municipality. In Yalova Municipality's strategic plan, a limited number of objectives addressed these areas. In addition, despite the inclusion of 'women's economic empowerment' among the goals of the cities analyzed, the number of women working in municipalities is quite low. This is an example of the weak implementation of decisions taken by local governments. The study revealed that the development levels of the municipalities examined in the context of women-friendly city practices do not show much difference on urban services. Municipalities should adopt a more fair, inclusive and egalitarian approach in the urban services they provide. The equal utilization of urban services by all segments of the society (regardless of men/women) will make a significant contribution to making cities more livable areas.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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A Comparative Study on VR Games in terms of Digital Media Users

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Abstract: Digital media users, who have integrated digital technologies into their daily lives, represent a broad spectrum of age groups and backgrounds. Digital natives, commonly referred to as individuals who were born and raised in the digital era, have grown up surrounded by digital technologies and are characterized by their deep integration and familiarity with them; while digital hybrids represent a transitional group, consisting of individuals who have adapted to the digital world later in life, either through necessity or choice. Understanding the dynamics between digital natives, and digital hybrids, as digital media users, in the realm of VR games is crucial for game developers, researchers and the gaming industry. This study aims to serve as a foundation for further exploration and analysis of the evolving relationship between these media user groups and virtual reality (VR) games, shedding light on the implications for gamer gratifications and media use in the digital era.

Keywords: Digital media users, Digital natives, Dijital hybrids, VR games, Gratifications

Introduction

There are various ways to classify digital media users including active or passive (Hall, 1973; Blumler & Katz, 1974; McQuire, 1974; Blumler, 1979; Swanson 1979; McQuail, 1983; Levy & Windahl, 1984, 1985; Fiske, 1987; Rubin & Perse, 1987; Biocca, 1988; Ruggerio, 2000) prosumers (Toffler, 1980; Atheque, 2013) or players/gamers (Bartle, 1996) based on their media behavior, engagement, or preferences. Prensky (2001), on the other hand, classifies media users based on their familiarity and comfort with technology. Prensky (2001), defines young people whose mother tongue is the digital language of computers, digital games and the Internet as digital natives, and people who were not born in the digital world but have adopted many or most aspects of new technology at a later point in their lives as digital immigrants.

While Prensky included only the concepts of digital native and digital immigrant in his study, Yıldız (2012) suggests the terms digital hybrid for those born between 1970-1999, digital immigrant for those born before 1970, and digital native for those born in 2000 and later. Digital hybrids provide a transition between digital natives and digital immigrants and have the characteristics of both groups. Digital hybrids both try to take advantage of all the possibilities of technology like digital natives and still find printed materials very close and friendly, on the other hand, they are not resistant to technology like digital immigrants.

Virtual reality games are 3D game environments that combine digital games with virtual reality technology, activating multiple senses of the gamers such as hearing, seeing and touching through special virtual reality equipment and providing a real experience (Bohil et al., 2009; Jerald, 2015; Dani, 2019). When the theory of Uses and Gratifications, which explains how individuals use the media to meet their needs and desires, is applied to virtual reality games, it reveals that gamers play VR games to meet certain needs and desires and obtain some gratifications (Katz et al., 1973; Palmgreen et al., 1980; Rubin, 1983; McQuail, 1984; Rosengren et

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al.; 1985; LaRose et al., 2001). Accordingly, a gamer may play virtual reality games to satisfy their needs for competition, challenge, social interaction, diversion, fantasy and arousal (Sherry et al., 2006). Gamers are expected to play digital games to be the best player in the game (competition); to win the game or to move on to the next level (challenge); to socialize with friends (social interaction); to pass time or to relieve boredom (diversion); to do things they cannot do in real life, such as flying (fantasy); and to feel the excitement (arousal) (Sherry & Lucas, 2004).

Research Questions

The research questions determined by the researchers are as follows:

1. Is there a significant difference between age groups in terms of the gratifications obtained?
2. Is there a significant difference between age groups in terms of the frequency of playing VR games?
3. Is there a significant difference between age groups in terms of the duration of playing VR games?
4. Is there a significant difference between age groups in terms of the gamer level?
5. Is there a significant difference between age groups in terms of the gaming place?

Method

In this study, quantitative research method was adopted and a questionnaire was used as a data collection tool.

Sampling and Sampling Method

Data were collected from 399 participants (aging between 18-53 and living in Istanbul province) who play VR games and snowball sampling method was chosen as the sampling method. Yazıcıoğlu & Erdoğan (2004) state that 384 participants will be sufficient for the sample for a finite number of universes. Accordingly, 399 participants have the ability to represent the universe. Based on Yıldız (2012) study, participants aged 18-23 (those born in 2000 and later) were classified as digital natives and participants aged 24-53 (those born between 1970-1999) as digital hybrids.

Scale

Since there is no scale developed on VR games gratifications, six gratification dimensions were determined with reference to the scale named "Video Game Uses and Gratifications Instrument" developed in the study named "Video Game Uses and Gratifications as Predictors of Use and Game Preference" (Sherry et al., 2006).

Data Collection Method

The questionnaire, which was determined as the data collection method, consists of a total of 30 questions and three sections. In the first part, there are four questions to determine the demographic characteristics of VR gamers. In the second part, there are 22 questions to determine the gratification factors according to the 5-point Likert scale. In this scale, the ranges of Totally Agree (5), Agree (4), Undecided (3), Disagree (2) and Totally Disagree (1) were given as response options. The third part consists of four questions about the game-playing habits of the gamers.

Limitations

One of the limitations of the research is that the sample of the research was applied only to VR gamers residing in Istanbul. As the questionnaire was filled through the online form, it was not possible to obtain information about the environment and how the participants filled the questionnaire. Due to the fact that VR technology is new and quite costly and many people cannot afford it in Turkey, it was difficult to reach the sample and the sample was limited to 399 participants.

Results

Cronbach's alpha value for 22 statements in the scale was determined as 0,946. In social sciences, widely accepted reliability level is 70% (Padem et al., 2012; Mallery, 2018), therefore, this value indicates that the study can be considered reliable.

In the first stage of the analysis, Varimax Rotation Components Analysis was performed. The Kaiser-Meyer-Olkin (KMO) sample size is .896% for the VR Games Gratifications Scale. Barlett Test of Sphericity was determined as 0.000 ($p<0.05$). Considering the reference values of the social sciences, these values show that the scale used in the study is suitable for factor analysis in the context of the data obtained. The total variance explained for the 6 gratifications obtained as a result of the explanatory factor analysis performed on the scale was determined as 64,934%. Dimensions in the scale are: Competition, Challenge, Arousal, Social Interaction, Fantasy, and Diversion. The variances explained according to the resulting dimensions are 13.683%, 11.267%, 10.838%, 10.276%, 10.139%, and 8.732%, respectively.

During the analysis, 3 statements (I enjoy doing new and creative things in the game, I play games when I have other things to do and playing VR games gives me excitement.) have been disabled as they do not comply with statistical rules. The factor loads of the expressions that make up the dimensions take values ranging from ,838 to ,426. The dimension with the highest standard deviation among the dimensions is Social Interaction (,89699); the dimension with the highest arithmetic mean is Difficulty (4,2707); the dimension with the highest Cr Alpha value is Arousal (,806); the highest variance explained is Competition (13,683). It is accepted that the variance values explained above 50% in social sciences are explanatory at a sufficient level (Streiner, 1994; Yaslıoglu, 2017).

Table 1. Findings of the Age Groups of the Participants

Variables		N	%
Age	18-23	206	51,6
	24-53	193	48,4
Total		399	100

When the age groups of the participants are evaluated (Table1), the participants between the ages of 18-23 (51.6%) and the participants between the ages of 24-53 (48.4%).

Research Question 1: Is there a significant difference between age groups in terms of the gratifications obtained?

Table 2. Difference in the gratifications obtained by age groups

Gratifications Obtained	Age Groups	n	$\bar{X}$	t	*p*
Competition	18-23	206	3,8447	1,807	,071
	24-53	193	3,6839		
Challenge	18-23	206	4,3058	1,097	,274
	24-53	193	4,2332		
Arousal	18-23	206	4,3204	3,833	,000*
	24-53	193	3,9845		
Social Interaction	18-23	206	3,5922	-,040	,968
	24-53	193	3,5959		
Fantasy	18-23	206	3,8835	,802	,423
	24-53	193	3,8187		
Diversion	18-23	206	4,1553	-,001	,999
	24-53	193	4,1554		

**It is significant at the p<0.05 level.*

Table 2 shows the evaluation of participants' perception of gratifications obtained from VR games in the dimensions of "Competition, Challenge, Arousal, Social Interaction, Fantasy and Diversion" by age groups. Accordingly, gratifications obtained from VR games differs according to the age group, as it provides ($p<0.05$) for the arousal dimension. According to the arithmetic means, there is a difference in arousal dimension due to the fact that the participants in the 18-23 age group ($\bar{X}$= 4.3204) reported more positive opinions than the

participants in the 24-53 age group ($\bar{X}$=3.9845). That is, digital natives obtained more gratification from digital hybrids in terms of arousal dimension.

Research Question 2: Is there a significant difference between age groups in terms of the frequency of playing VR games?

Considering the distribution of VR gaming frequency by age groups in Table 3, there are 19 participants aged 18-23 who play VR games for a few days a year, and 13 people aged 24-53 who play VR games for a few days a year. There are 43 participants between the ages of 18-23 and 27 participants between the ages of 24-53 who play VR games a few days a month. There are 24 participants between the ages of 18-23 and 14 participants between the ages of 24-53, who stated that they play VR games 1 day a month. There are 39 people between the ages of 24-53 and 30 people between the ages of 18-23, who stated that they play VR games 1 day a week. Between both age groups (18-23, 24-53) there are 19 participants who stated that they play VR games every day. Since the significance level for the Chi-Square value is greater than 0.05 (0.116), there is no significant difference between digital natives and digital hybrids in terms of VR gaming frequency.

Table 3. Difference in Frequency of Playing by Age Groups

Frequency of playing		Age Groups	
		18-23	24-53
A few days a year	N	19	13
	%	59.4	40.6
A few days a month	N	43	27
	%	61.4	38.6
Once in a month	N	24	14
	%	63.2	36.8
Once in a week	N	30	39
	%	43.5	56.5
A few days a week	N	71	81
	%	46.7	53.3
Every day	N	19	19
	%	50.0	50.0
Total	N	206	193
	%	51.6	48.4

Pearson Chi-Square: .116, it is significant at the p<0.05 level.

Reseacrh Question 3: Is there a significant difference between age groups in terms of the duration of playing VR games?

In the evaluation of VR gaming time according to age group (Table 4), the rate of participants who are in the 24-53 age range and play VR games for 1-4 hours daily is 50.5%, while the rate of participants aged 18-23 who play VR games for 1-4 hours per day is 49%. While the rate of participants in the 18-23 age group who play VR games for more than 4 hours is 60.8, the rate of the participants in the 24-53 age group is 39.2. Accordingly, digital natives have longer VR gaming time. Since the significance level of the Chi-Square value is greater than 0.05 (0.080), there is no significant difference between the age groups (18-23, 24-53) according to the VR game playing time.

Table 4. Difference in duration of playing by age group

Duration of playing		Age groups	
		18-23	24-53
1-4 hours	N	161	164
	%	49.5	50.5
More than 4 hours	N	45	29
	%	60.8	39.2
Total	N	206	193
	%	51.6	48.4

Pearson Chi-Square: .080, it is significant at the p<0.05 level.

Research Question 4: Is there a significant difference between age groups in terms of the gamer level?

Table 5 indicates that among the participants aged 18-23, there are 65 beginner participants, and among the participants aged 24-53, there are 57 beginners. At the intermediate level, there are 108 participants between the ages of 24-53 and 100 participants between the ages of 18-23. There are 206 individuals between the ages of 18-23 and 193 people between the ages of 24-53 who are advanced VR gamers. Since the significance level of the chi-square value is greater than 0.05 (0.239), there is no significant difference in the level of gamers between digital natives and digital hybrids.

Table 5. Difference in gamer level by age group

Gamer Level		Age Groups	
		18-23	24-53
Beginner	N	65	57
	%	53.3	46.7
Intermediate	N	100	108
	%	48.1	51.9
Advanced	N	41	28
	%	59.4	40.6
Total	N	206	193
	%	51.6	48.4

Pearson Chi-Square: .239, it is significant at the p<0.05 level.

Research Question 5: Is there a significant difference between age groups in terms of the gaming place?

Table 6 shows that 53.1% of the participants between the ages of 24-53 and 46.9% of the participants between the ages of 18-23 play at home. While the percentage of participants between the ages of 18-23 who play games at VR café, workplace or school is 67.8%, the percentage of participants between the ages of 24-53 is 32.2%. Based on the findings, more than half of digital hybrids prefer to play games at home, whereas digital natives mostly prefer to play VR games outside the home. Since the significance level of the chi-square value is less than 0.05 (0.000), the gaming place differs between the age groups.

Table 6. Difference in gaming place by age group

Gaming place		Age groups	
		18-23	24-53
At home	N	145	164
	%	46.9	53.1
VR café/School/Work	N	61	29
	%	67.8	32.2
Total	N	206	193
	%	51.6	48.4

Pearson Chi-Square: .000, it is significant at the p<0.05 level.

Discussion and Suggestions

The findings of this study revealed that among the different age groups, only arousal (e.g. Playing VR games raises my level of adrenaline.) showed a significant difference in terms of the gratifications obtained. This implies that individuals across various age groups, regardless of whether they belong to the digital hybrid or digital native classifications, tend to experience similar levels of gratification and enjoyment when engaging with VR games. As the advancements in technology and the widespread availability of digital media have blurred the lines between digital natives and digital hybrids, they may have developed a certain level of familiarity and proficiency with digital devices and virtual environments. Consequently, the differences in gaming habits and gratifications obtained from VR games between digital natives and digital hybrids may be diminishing. One other reason for the lack of significant differences in gaming habits and gratifications could be attributed to the nature of VR gaming itself. Virtual reality offers a highly immersive and interactive experience that transcends age boundaries. The sense of presence and engagement within the virtual world may create a level playing field, where individuals of all age groups can equally enjoy and derive gratification from the unique aspects of VR games. The findings also have important implications for the design and development of VR games and experiences. Game developers should consider the universal appeal of VR technology and focus

on creating immersive experiences that cater to a wide range of age groups. By designing games that capture and maintain users' attention, regardless of their digital upbringing, developers can ensure a broader market reach and maximize the gratification obtained by players.

Finally, it is worth noting that this study has certain limitations that should be acknowledged. Firstly, the sample size and demographic characteristics of the participants may have influenced the generalizability of the findings. Future research should consider larger and more diverse samples to enhance the external validity of the results. Additionally, the study focused solely on age groups and did not consider other potentially influential factors, such as gaming experience, personality traits, or technological proficiency. Future studies could explore these variables to gain a more comprehensive understanding of the factors contributing to the gratifications obtained from VR gaming.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Starting Point: An Investigation of Awareness Studies for Individuals with Special Needs in the Preschool Period

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Abstract: Preschool is a critical developmental period when the first steps are taken in terms of forming different attitudes and judgments. The main motivation source of this study is the absence of a study where research on the acceptance of individuals with special needs and raising awareness for them in preschool, which is considered the first step toward inclusion, is synthesized. Therefore, the present study aims to systematically determine which awareness studies are carried out in classroom and school settings to increase the social acceptance of children with special needs, who take the first step into the inclusive education process with preschool education in Turkey. This study was conducted by adopting the systematic review methodology. Considering the criteria determined in the current study, no year limitation was made for the beginning. Studies published in the national literature and conducted on "Awareness for individuals with special needs in the preschool period" were examined. To this end, an advanced search field was used in Anadolu University Library databases; the DergiPark database, Google Scholar search, and National Thesis Center were also included in the screening process. The research includes theses conducted with individuals with special needs in the preschool period and studies published in national and international refereed journals in Turkish and English. A total of 41,724 studies were obtained. The studies obtained as a result of the screening continue to be examined according to the determined inclusion and exclusion criteria. The screening process and the application process of the inclusion and exclusion criteria will be visualized by adopting the PRISMA model. The included studies will be analyzed descriptively. The findings regarding the demographic, methodological, and finding variables of the studies will be shared in detail during the presentation at the congress.

Keywords: Preschool education, Awareness, Children with special needs, Respect for diversity, Empathy

Introduction

Children attribute various meanings to diversity in different age groups. To talk to children about the concept of diversity or to carry out an activity on this subject, the developmental readiness of children for this concept should be considered. The first two years of life are critical in terms of the formation of pre-prejudices (Carnegie Corporation, 1994). *Prejudice* can be defined as an attitude, belief, or feeling that causes and justifies unfair treatment due to a person's identity (Derman Sparks & Edwards, 2010). Children start to be interested in right and wrong behaviors around the age of two (Derman & Sparks, 1989; Divrengi & Aktan, 2010). Hence, concepts such as competence, age, appearance, beliefs, class, culture, family composition, gender, race, sexuality, and diversity, regardless of the reason, are among the concepts to which children may develop prejudices in different age groups (Beckett, 2009; Kaymaz, 2017). The preschool period is a very critical developmental period when the first steps are taken in terms of the formation of different attitudes and judgments. Therefore, the aforesaid period should be considered the first developmental/education period that must be studied for children to gain awareness of different attitudes and behaviors and develop positive attitudes and behaviors toward diversity, and create classroom settings without prejudice.

Table 1. Formation of diversity concepts in early childhood

Age	Diversity Development
3-4 Months	• Begin to separate themselves from others. • Are affected by their own voice and the attitudes and behaviors of people caring for them. • Try to imitate the facial expressions of people around them. • Begin to become sensitive to the feelings of others. • The ability to empathize with others starts during this period.
1 Years Old	• Begin to realize that they have a different mental world than their family, but they may have some common thoughts. • Notice visible physical disabilities, such as skin color. • Notice gender and racial/language differences and are interested in these differences. • Realize they are a "person" in the eyes of people around them.
2 Years Old	• First notice their body. • Begin to learn the names of their body parts and their basic functions. • While learning their body parts, they begin to become aware of their sexual region. • Become aware of their gender. • Begin to wonder why people differ in their skin color, hair color and type, eye color and shape, and all other physical characteristics. • If there is an individual with special needs in their family, they can also understand this difference; otherwise, this awareness develops at an older age.
3 Years Old	• Form pre-prejudices (*pre-prejudice period*). • Show that they are uncomfortable with people's certain characteristics (skin color, gender, physical disability, language). • Begin to notice people from different ethnic backgrounds and their various traditions (e.g., different meals, traditional holidays, etc.). • Begin to understand the cultural situation concerning gender behaviors and attitudes and act in line with this situation. For example, boys prefer to play with cars, while girls prefer to play with dolls. • Begin to ask questions about language, gender, and physical differences in line with their own and others' characteristics.
4 Years Old	• Are curious about the reasons and sources of diversity. For example, will my hair color be different when I grow up? Why do my friend and I look different? • Ask questions about physical characteristics, such as "If I play with a child with a physical disability, will I be disabled like him?" and try to understand the answers. • Display awareness of family structures and economic class differences. • Begin to form positive or negative ideas about the causes of people's different characteristics based on the attitudes of people around them and their own observations and experiences.
5 Years Old	• Wonder which of their characteristics are permanent and which can be changed. • While trying to understand their cultural identities and cultural backgrounds, they begin to perceive that there are differences in every culture and every group displays similarities within itself. • Scientific explanations about diversity can be made to children beginning from this age. • Begin to have precise information about the behavior of men and women around them. • The stereotypes of activities and professions develop. For example, girls do this, boys do this, girls play with this, boys play with this.
6-8 Years Old	• Attempt to understand people of different nationalities, races, religions, and cultures and understand that their characteristics cannot be changed. • The factor determining children's attitudes is the behavior of the people around them. • Self-respect for culture begins during this period. • Elements in the child's micro (family, home environment, close environment, etc.) and macro system (media, culture, etc.) have a significant effect on what kind of attitude they will develop toward diversity. • Even if there are individuals prejudiced against diversity in children's families, if a prejudiced attitude toward diversity is not displayed in their school, children can decide for themselves what type of behavior they will choose.

Formation of the Concept of Diversity in the Preschool Period

Instead of accepting the difference of the person people think is different in society, they usually tend to approach that person with prejudice. Concepts of diversity that are generally open to diversity are as follows: physical, cognitive, and emotional *competence*, *appearance* as definitions such as weight and height and age as the state of being young or old, *beliefs* such as religious, etc. values, class determining the socio-economic status, *culture* as shared values, family *composition* that refers to the family structure, *gender* as the state of being a female or a male, *race* that determines original and physical characteristics, and *sexuality* that expresses sexual preference and orientation (Divrengi & Aktan Acar, 2012).

Early childhood is a critical period for creating positive awareness of diversity (Murray, 2012). Children realize information about physical appearance and identity concepts quite early. Hence, the first years of life are very critical for the formation of prejudices (Aktan & Divengi, 2010). For this reason, the period from birth to the age of three is crucial in terms of the formation of first prejudices (Deman Sparks, 2010). Table 1 contains children's perceptions of diversity in the developmental sense by age groups (Aktan & Divengi, 2010; Artan, 2018; Derman Sparks, 2010; Ekmisoglu, 2007; Eren, 2015; Foundation for the Support of Women's Work, 2006, pp. 9-11; Pektas, 2022; Yıldız, 2019).

As seen in Table 1, children become aware of diversity by observing their surroundings from a young age and develop feelings, thoughts, and behaviors toward diversity under the impact of their environment. In general, it can be stated that the age range of 3-7 is critical in terms of gender, race, and special needs issues. Children begin to have labels and emotional reactions concerning these issues during the said period (Derman-Sparks, 2010). Preschool children are open to learning about this diversity as well as they have certain stereotypes about diversity. What children learn about different people around them will impact how they grow up and what kind of adults they will become in the future. Hence, it can be aimed to raise the awareness of children by providing respect for diversity education starting from this age. *Respect for diversity* can be defined as understanding the similar and different aspects of people in physiological and sociological terms and behaving tolerantly by accepting people with their differences (Uner, 2011). Therefore, when it is planned to conduct studies on developing respect for diversity, the characteristics of children during these periods should be reviewed, and their age period should be taken into account.

Respect for Diversity Education

The multicultural education approach constitutes the basis of respect for diversity education programs. Multicultural education addresses many dimensions of diversity, such as culture, race, gender, age, occupation, economic status, sexual preference, and various physical characteristics (Uner, 2011). Derman-Sparks shaped respect for diversity education with the anti-bias curriculum, which she developed by bringing a different dimension to multicultural education based on prejudice and discrimination (Derman-Sparks, 2010). The fact that children create a positive self-identity, learn to develop empathy by empathizing with their environment, recognize what discrimination is and learn that it is necessary to deal with it are among the goals of the anti-bias curriculum (KEDV, 2006; Uner, 2011).

In Turkey, the concept of respect for diversity was included in education with the 2006 MoNE Preschool Education Program and extended with the 2013 MoNE Preschool Education Program to include more activities and acquisitions in line with this concept. Concerning the goals of respect for diversity education, this education should be planned by considering the sub-dimensions of gender, different cultures, different family structures, and being an individual with special needs. In the context of respect for diversity education, children and young people with special needs are in a disadvantageous position compared to their peers in the field of education due to their special needs, not considering their differences, facing income poverty, and the risks of social exclusion (Ozkabak Yıldız, 2018).

It is usually seen that individuals who do not have special needs or who do not have a person with special needs in their environment have prejudices against individuals with special needs. Therefore, individuals with special needs may face disregard, ignoring, pity, and attitudes and behaviors in which only special needs are seen. For this reason, teachers in preschool education institutions should include respect for diversity education programs based on integrative/inclusive education (KEDV, 2006). Within the scope of respect for diversity education, discrimination due to the state of being with special needs should be eliminated by stressing that an individual may have special needs from birth or later, children with special needs should benefit from their rights to education and development, individuals with special needs have things they can and cannot do like everyone

else, but that they can perform numerous skills and behaviors in particular (Ekmisoglu, 2007; Eren, 2015). Hence, it is crucial to conduct studies on prejudice, discrimination, and diversity during this period since preschool covers the critical years in terms of the formation of prejudices.

Rationale of the Study

It is among the most fundamental rights of individuals with special needs to live in a society where they are accepted and respected (Centre for Studies on Inclusive Education, 2016). This fundamental right is only possible if a common living space is provided to individuals with special needs by all units that make up society from the micro to the macro level, such as family, school, and non-governmental organizations starting from the individual. Raising children who can empathize and exhibit sensitive behaviors toward individuals with special needs starting from the preschool period will be possible not only with integrative/inclusive education but also by having an integrative/inclusive society. This is a social cycle, and to break this cycle, it is necessary to reveal what kind of awareness and/or empathy studies are conducted to increase the acceptance of these individuals. Therefore, it is necessary to determine what is done concerning respect for diversity in order to ensure the acquisition of these behaviors in classroom settings.

Purpose of Research

According to Boroson (2017), creating a meaningful integrative/inclusive classroom culture starts with spreading awareness and planning for this, from students in the classroom to the building staff. Hence, the present study aims to systematically determine which awareness studies are carried out in classroom and school settings to increase the social acceptance of children with special needs, who take the first step into the integrative/inclusive education process with preschool education in Turkey. Studies to be obtained in line with this will present an overview in terms of characteristics such as how individuals with special needs are mostly represented, in what kinds of activities children with special needs are included, what kind of language is used when describing children with special needs, how children with special needs are described, what the main features of the activities are, and what kind of equipment is used in studies. In line with this purpose, answers to the following questions will be sought:

1. What are the methodological characteristics of the studies (participant characteristics, research designs, measurement tools)?
2. What are the main findings of the studies?
3. What are the recommendations of the studies for educational practices?

Importance of Research

The fact that the social acceptance of children with special needs, who have been placed in classes within the scope of inclusive education in the past, cannot be fully realized by typically developing children is one of the largest recent difficulties faced by children in integrative/inclusive education (Beckett, 2009; Boroson, 2017). In this regard, it can be said that preschool education plays an important role in changing and regulating the negative attitudes of typically developing individuals toward individuals with special needs. It is planned that this study will be conducted considering that it is important in terms of carrying out improvement studies for integrative/inclusive education and will contribute significantly to preparing integrative/inclusive learning settings, and will also create a theoretical background for further research. The original aspect of the study is that no study synthesizing research on the acceptance of individuals with special needs and awareness raising in the preschool period, which was previously considered the first step toward integration, has been found.

Method

Resarch Design

The current study was conducted by adopting the systematic review methodology. Systematic reviews, expressed as the examination of studies on the same subject in accordance with the determined objectives and criteria, are used in educational research to guide future research and interventions in the field by revealing important connections and practices in the field.

Literature Review Process

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) model steps were adopted in the screening and selection of publications. PRISMA guides researchers in compiling and reporting studies examined with a systematic method (Moher et al., 2009). The research examined publications on awareness studies in preschool classroom and school settings aiming to increase the social acceptance of children with special needs in Turkey, without publication year limitations. As seen in Table 2, five keywords such as "preschool period," "individual with special needs," "awareness," "respect for diversity," and "empathy" and combinations of these words (5x4=20) were determined as search terms to this end. An advanced search field was used in Anadolu University Library databases in a systematic way with the determined key terms, and an electronic search was done by selecting "all providers" as the database. Furthermore, a search was done in the DergiPark database, the Google Scholar search engine, and the National Thesis Center on the subject. Additionally, it was aimed to reach the studies not reached during the search by examining the references of the reached publications. As a result of the search, a total of 41,724 publications were reached, 26,300 from the databases and 15,724 from the Google Scholar search engine.

Inclusion and Exclusion Criteria

The following criteria were considered when including publications in the study: a) studies published until March 2023 without the beginning year limitation, b) studies conducted with Turkish participants, c) participants being children with special needs receiving preschool education, d) studies published in the national literature in Turkish or both in Turkish and English, e) the study subject being raising awareness of individuals with special needs in the preschool period and focusing on respect for diversity education. The exclusion criteria were determined as follows: a) the group of participants being students in the school period, b) awareness education being aimed at teachers or families, c) publications being books or book chapters.

Table 2. Search terms used for queries in the databases

Terms		Combinations of terms
Preschool Period	AND	Individual with Special Needs Awareness Respect for Diversity Empathy
Individual with Special Needs	AND	Preschool Period Awareness Respect for Diversity Empathy
Awareness	AND	Preschool Period Individual with Special Needs Respect for Diversity Empathy
Respect for Diversity	AND	Preschool Period Individual with Special Needs Awareness Empathy
Empathy	AND	Preschool Period Individual with Special Needs Awareness Respect for Diversity
		Total: 23

Note: The terms consisting of two or more words were included in the query by showing them in quotation marks.

Considering the inclusion and exclusion criteria, the second researcher performed the first control of all studies by first reading their titles, eliminating duplicates, and excluding books and book chapters. Figure 1 displays the flow chart showing the eligibility process in determining publications. In line with the inclusion criteria, 19

publications were included in the study by excluding repetitive publications and book chapters after the first detailed reading of the abstracts. The method sections were read in detail during the second reading. Thirteen publications outside the research focus were eliminated after this detailed reading. Six studies determined at the end of this process were included in the research for descriptive analysis.

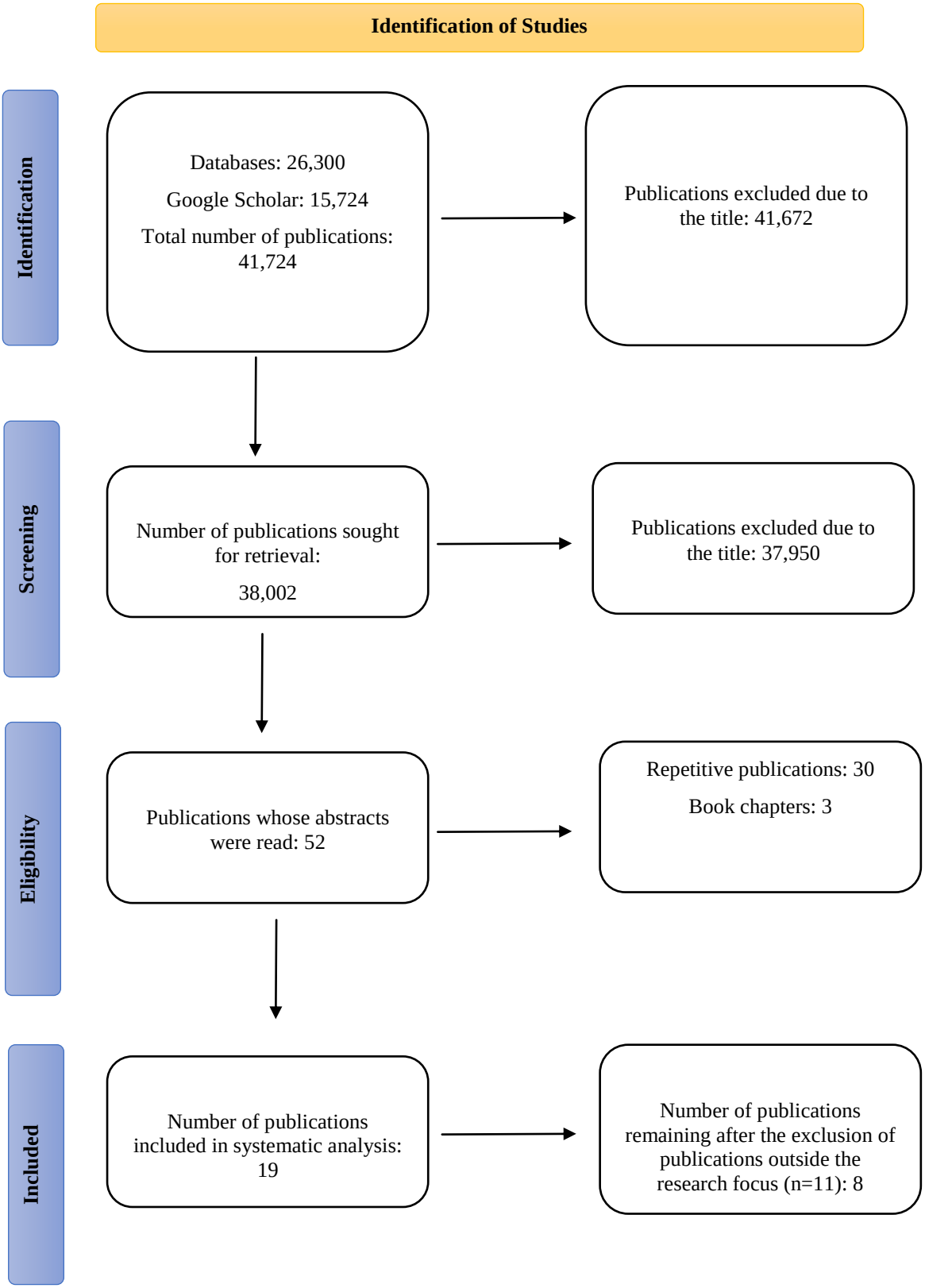

Figure 1. Flow chart showing the eligibility process in determining articles.

Descriptive Analysis

Two articles and four theses that met the inclusion criteria were examined within the scope of the study for descriptive analysis. Descriptive analysis represents the systematic and comprehensive examination of academic studies on a specific subject according to the predetermined criteria (Gough et al., 2017). The researchers prepared a descriptive analysis coding table to this end. The studies were analyzed in terms of demographic, methodological, and finding variables, including the number of participants, the age of the participants, research design, dependent variable, independent variable, the interventions used in the education of children, the content of awareness studies, and the research result.

Two different inter-rater reliability data were collected in the study. First reliability data were made concerning the literature review of the study. Primarily, the researchers did a search in the determined databases using the search terms employed for the search. After grouping the publications they reached by the databases, the researchers compared the resulting numbers. It was found that the researchers reached the same publications. Second, the study's authors coded the two studies together and the others independently, according to the items in Table 3. While calculating the inter-rater reliability, the formula "inter-rater agreement/inter-rater agreement +inter-rater disagreement X 100" was employed. The researchers came together and discussed the disagreed codings, and consensus was reached. The inter-rater reliability coefficient was calculated as 100%.

Findings

Table 3 summarizes the findings regarding the demographic, methodological, and finding variables of the 6 studies that aimed to determine what awareness activities are carried out in classroom and school settings to increase the social acceptance of children with special needs who take the first step into the integrative/inclusive education process with preschool education in Turkey. The year of publication was taken into consideration while summarizing the studies, and the studies were listed from the present to the past.

Findings Regarding Methodological Characteristics

Methodological characteristics were analyzed in seven different categories: a) number of participants, their gender and age, b) research design, c) dependent variable, d) independent variable, e) interventions used in education, f) content of awareness studies, and g) research results.

Number of participants, their gender and age. Research was conducted with a total of 104 children in the 6 studies reached within the scope of the research. Upon examining the participants under the gender title, it was observed that 104 children consisted of 47 females and 57 males. Considering the studies separately by age groups, it was seen that 4 studies were conducted with children aged 5-6 years, one study with 4-6-year-old children, and one study with 5-7-year-old children. It can be said that the participants were in the 4-7 age range in general.

Research design. It was found that two of the 6 studies within the scope of the research used the single-subject research method (Tıkıroglu, 2019; Ozaydın et al., 2008), two used the experimental method (Yıldız, 2019; Öztürk & Yıkmış, 2013), one used action research, one of the qualitative research methods (Kapsız, 2021), and one employed the mixed research method (Erdogan & Bas, 2018).

Dependent variable. Concerning the dependent variables of the studies included in the research, it was seen that two studies examined special needs individual awareness (Kapsız, 2021; Erdoğan & Baş, 2018), two studies examined social interaction behaviors (Tıkıroglu, 2019; Ozaydın et al., 2008), one study examined children's attitudes toward their peers with intellectual disabilities (Ozturk & Yıkmıs, 2013), and one study examined respect for diversity (Yıldız, 2019) variables.

Independent variable. Upon examining the 6 studies included in the research, it was observed that 6 different education programs were studied, including the peer education program in two studies (Tıkıroglu, 2019; Ozaydın et al., 2008), the development program for peers with intellectual disabilities in one study (Erdogan & Bas, 2018), the respect for diversity program in one study (Yıldız, 2019), creative drama in one study (Erdoğan & Baş, 2008), and special needs awareness in one study (Kapsız, 2021).

Table 3. The studies' demographic, methodological, and finding characteristics (continued)

Source	Number and Gender of Participants	Age of Participants	Research Design	Dependent Variable	Independent Variable	Interventions Used in Education	Content of Awareness Studies	Research Result
Kapsız, 2021	7 typically developing children 4 females 3 males	5 years old	Action research	Children's Special Needs (Disability) Awareness	Special Needs (Disability) Awareness Education Program	Direct instruction Case explanation Dramatization Video-based teaching	Children were provided with general information about being with special needs in the first week. Awareness education was provided for a total of 14 weeks by conducting studies on raising awareness of a special needs diagnosis group every subsequent week.	It was stated that children became aware of their peers with special needs, Could empathize with individuals with special needs, Developed positive attitudes toward individuals with special needs.
Tukuroğlu, 2019	9 children 7 females 2 males	5-6 years old	Single-subject research method	Social interaction behaviors	Peer Education Package	Watching videos Question-answer Playing games	Studies were conducted on awareness of children with autism spectrum disorder by ensuring that children watched videos on diversity and by talking to them, doing activities, and reading books.	In the research conducted with peer-mediated teaching, the evaluation of the effectiveness of awareness studies was not considered a goal.
Yıldız, 2019	24 children 10 females 14 males	5-6 years old	Experimental method	The effect on 5-6-year-old children's level of respect for diversity	Respect for diversity program provided to children with the creative drama method	Creative drama method	Studies were conducted on diversity regarding special needs for two weeks within the scope of the 12-session "Respect for Diversity" education. Activities were carried out with children using the drama method.	It was reported that the respect for diversity education provided with the creative drama method was effective in increasing the children's level of respect for diversity.

Table 3. The studies' demographic, methodological, and finding characteristics (continued)

Source	Number and Gender of Participants	Age of Participants	Research Design	Dependent Variable	Independent Variable	Interventions Used in Education	Content of Awareness Studies	Research Result
Erdogan and Bas (2018)	11 typically developing children 4 females 7 males	4-6 years old	Mixed method	Special needs individual awareness	Creative drama method applied by making use of children's literature products	Creative drama method	Three areas of disability, orthopedic, hearing impairment, and intellectual disabilities, and books suitable for children's development were selected, and the awareness of typically developing children regarding these disability groups was raised.	It was seen that children became aware of differences and disability, Acquired knowledge and awareness in the areas of disability, Made progress in the areas of positive attitude development.
Oztuk and Yikmis (2013)	36 typically developing children 19 males 17 females	5 years old	Experimental research	Children's attitudes toward their peers with intellectual disabilities	Information program for peers with intellectual disabilities	Direct instruction Storytelling Simulation Expert participation Video recording	The information program consisted of 10 sessions. In each session, a different subject concerning intellectual disability was discussed, and awareness of these individuals was developed.	Significant differences were reported in the attitudes of children participating in the information program regarding children with intellectual disabilities toward children with intellectual disabilities compared to the group not participating in the program.
Ozaydın et al. (2008)	17 children 12 males 5 females	5-7 years old	Single-subject research method	Social interaction behaviors	Friendship Skills Development Program	Direct instruction Showing videos Modeling Visual prompts	Within the scope of sensitivity education, typically developing children were shown images of the special needs child in their classroom and talked to about the subject.	Evaluation of the effectiveness of awareness studies was not considered a separate purpose in the research conducted to develop friendship skills.

Interventions Used in Education. Considering the 6 studies included in the research, it is remarkable that more than one intervention is used in each study. Interventions such as direct instruction, storytelling, video-based teaching, creative drama, modeling, and visual prompts were used in the content of the studies.

Content of awareness studies. Upon examining the awareness content of the studies within the scope of the research, it was revealed that three studies applied an awareness-raising program to children week by week for a certain period (Kapsız, 2021; Yıldız, 2019; Ozturk & Yıkamıs, 2013), two studies employed methods such as watching videos, creative drama, and modeling (Tıkıroglu, 2019; Yıldız, 2019), and one study attempted to raise awareness in children within the scope of an activity application (Ozaydın et al., 2008).

Research results. Upon analyzing the results of all studies, it was observed that typically developing children in the class became aware of their peers with special needs and developed a positive attitude toward their peers with special needs as a result of four studies (Kapsız, 2021; Erdogan & Bas, 2018; Ozturk & Yıkamıs, 2013), but two studies could not evaluate the effectiveness of awareness studies since the effectiveness of awareness studies was not a purpose of the research (Tıkıroglu, 2019; Ozaydın et al., 2008). Nevertheless, in the social validity findings, it was stated that children exhibited considerably positive attitudes toward their peers with special needs.

Conclusion

The present research aiming to determine which awareness studies are carried out in classroom and school settings to increase the social acceptance of children with special needs who take the first step into the integrative/inclusive education process with preschool education in Turkey attempted to reach all publications conducted to this end until March 2023 without time limitation in the review process of the national literature. This enabled the studies to be analyzed from a more holistic perspective. Nevertheless, the most important finding of the current study is that despite the fact that inclusion/integration practices have been carried out in Turkey for many years and even though inclusive education with multiculturalism has been mentioned, very limited awareness studies have been performed to increase the social acceptance of children with special needs in the preschool period. However, it is known that the basis of the attitudes and behaviors that individuals will display in their lives is laid in early childhood. Hence, to ensure the full participation of individuals with special needs in social life, first creating environments without prejudice in preschool classes and then gradually expanding these environments and providing hope that all environments where individuals will participate will be similar will be possible only by effective work in these early years. This review indicates that we are, unfortunately, still at the very beginning of the road.

Teachers' knowledge, attitudes, and behaviors are another important point that should be mentioned at the end of the study. It is stated in the literature that teachers who have knowledge about individuals with special needs and integration approach students with special needs with more positive attitudes than those who do not have such knowledge (Can & Kara, 2017; Cıtak, 2020; Yazıcı & Akman, 2018). Therefore, conducting awareness activities for children with special needs at the desired level probably depends primarily on teachers' developing positive attitudes about awareness-raising. At this point, teachers' cooperation with families, receiving pre-service and in-service training, and increasing their professional responsibility awareness and in-class experiences can be listed among the things that should be done for them to develop positive attitudes.

Recommendations

It is essential that studies to be conducted to raise awareness of typically developing children of their peers with special needs are carried out systematically within the framework of a standard education program. At this point, more activities and acquisitions should be included in preschool education programs in line with the concept of respect for diversity in preschool education by the MoNE. Considering the objectives of respect for diversity education, this education can be planned systematically by addressing the sub-dimensions of gender, different cultures, different family structures, and being with special needs.

Since children form prejudices toward various concepts in different age periods, studies can be conducted to determine the impact of different methods (drama, play, project approach, storytelling, etc.) on gaining respect for diversity by children of different ages. Sample activities can be explained by organizing education for preschool teachers on how to ensure that children gain respect for diversity in in-service training. Moreover, teachers can be supported in improving themselves by giving practice examples or books prepared on this

subject. As a result of adding family education and participation studies to the awareness/empathy education programs to be prepared for children, integrated research can be performed by including the education of children at school, the skills they learn, and their families in the process.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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University Students' Perceptions of Ethical Leadership and Work Ethics

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Abstract: To achieve the sustainable development goals, it is recommended that organizations worldwide set and adhere to ethical and governance standards. Workplace ethics is an expression of the values an organization holds towards its employees, and therefore includes the behavior of managers and their leadership style and practices. The young generations' perceptions of ethical leadership are worth exploring because they will be the decision-makers of the future. In our research, we interviewed Hungarian university students - mainly studying economics - about ethical leadership and work ethics who have had work experience (N=143). We developed our hypotheses based on Starratt's three-dimensional ethical model and conducted SEM analysis using SmartPLS4 software. We found that the Ethics of Justice factor influences the Ethics of Critique and Ethics of Care factors. Our results also show that achieving greater social justice is important to them in their decision-making. The surveyed Generation Z in Hungary considers the interests of both the individual and the community to be important for workplace ethics. Our research contributes to young people's understanding of ethics in the workplace and ethical leadership.

Keywords: Ethical leadership, Generation Z, Starratt's three-dimensional model, Dimension of individualism-collectivism

Introduction

Imagine the following situation. A teenager is at a job interview and answers the questions. Everything seems to be going well, when suddenly he hears a beep, indicating a new text message on his mobile phone. The teenager automatically reaches for his mobile and his fingers are already typing. His eyes dart back and forth between his phone and the interviewer (Jones, 2011). It is not a special story, but illustrates a new, almost instinctive habit of the young generation, and it also shows that there are some habits and characteristics that they have that are different from the older generations. The big question for us is what and how young people differ. Does this include ethical issues?

The spread of the concept of Employer Branding is clear evidence that organizations need to compete to attract and retain the best employees. The ethical standards and practices of the workplace are important to employees. Nowadays, ethical processes include ethical leadership. To answer our questions, after a review of the relevant literature, we present the results of our questionnaire survey and make suggestions for further research.

Literature review

According to Cambridge Dictionary ethics “is a system of accepted beliefs that control behavior, especially such a system based on morals. But it is also the study of what is morally right and what is not” (Cambridge Dictionary). Hornby (2015) adds that “ethics as moral principles that controls or influences person’s behavior, professional or business or is a branch of philosophy that deals with moral principles” (p. 427). Originally, we can talk about descriptive ethics, which describes the actual ethical and moral state of a society, the existing norms and behaviors. Descriptive ethics draws on the findings of sociology and psychology. Prescriptive ethics

is not about existing morality, but about what morality should be. Its task is to give norms, to define what is ethically right and desires the ethically desirable behavior. Business ethics belong to applied ethics and involve "rules, principles, and standards for deciding what is morally right or wrong when doing business" (Cambridge Dictionary) This includes the principles and norms of how the organization behaves towards its external stakeholders, but also how it acts as an employer. From the perspective of business ethics, two other ethical concepts are worth mentioning. One is constructivist ethics, which seeks to put moral standards into practice. The other is consensual ethics; David Gauthier called it cooperative ethics, explicitly stressing that cooperation is more than mere coordination, as the cooperator chooses the course of action that leads to mutual benefits (Gauthier, 2013).

In the 21st century, the unfortunate side effects of globalization and liberalization are corruption, favoritism, the erosion of human values and the widening of social inequalities. Nevertheless, ethical standards are also becoming an increasingly important factor, and it is no longer enough for companies to operate effectively in a fiercely competitive environment, but also to comply with community standards and ethical principles of public behavior. It is therefore necessary to define the organization's expectations, both of other market players and of its own employees. Business behavior, which includes ethical elements and attitudes, is becoming more widespread throughout the world and the adoption of codes of ethics by organizations and their incorporation into the core operations of the company is spreading (Girisha et al., 2020). In practice, workplace ethics shows the values that an organization holds towards its employees (Meyer, 2019).

Both individuals and organizations therefore consider ethics important, and most of them try to live and behave accordingly. Then why good people do bad things? "Decades of evidence shows us that situation can persuade even most ethical and compassionate people to betray their own values," (Phil Zimbardo, who conducted the famous Stanford Prison Experiment 1971 (Bekiempis, 2015). Maybe it happens due to ethical fading. Ethical fading happens when a decision somehow fades away from the ethical aspects of it (Ethics & Compliance Association, 2015). This may be because we focus more on the factors of the decision, such as profit or winning, while we want to see what we are looking for in the first place, and so the ethical dimensions may be overshadowed. This can be traced back to the ethical dilemma between the "should" (our values, principles) and the "will/want" (our self-interest, protection of ourselves). A well-known example of ethical fading from the pharmaceutical industry was when Martin Shkreli, the CEO of a pharmaceutical company, first made a generic version of a life-saving drug unavailable in order to increase profits, then overnight raised the price by nearly 4000% (for which he was jailed) (e.g. Torchinsky, 2022).

Ethical leadership involves consideration, and accountability (Brown et al., 2005), integrating the leader's own interests and values with those of the community or the other party (May et al., 2003), the importance of relationships between managers and their subordinates (Van Den Akker et al., 2009), applying ethical competence (Osafo et al., 2021), encouraging employees to behave ethically for the common good (Hollander, 2012), and ethical behavior even in risk situations (Johnson, 2018). In case of ethical leadership managers communicate honestly and treat employees with trust (Yildiz, 2019), and as a consequence it raises efficiency and improves job satisfaction (Schwepker, 2019). According to Starratt (2004), one of the most important qualities of an ethical leader is credibility. "The authentic educational leader unceasingly cultivates an environment that promotes the work of authentic teaching and learning." (p. 81)

Starratt's three-dimensional model of ethics (1991) is based on a multifaceted and deep philosophical foundation, and is primarily intended for educational institutions, providing recommendations on how to run an ethical educational institution. But it is also favored by the academic world (the article currently has 2050 downloads and 970 citations); in the empirical part of our paper we will apply this model and elements of it.

The three elements of Starratt's model (1991): *The ethic of critique.* The most common issues involved here are sexist language, legal and racial prejudice in the workplace, the education system and other areas of social life; and the rationalization and legitimization of prisons, orphanages, armies, the nuclear industry and the state itself. This factor includes issues of hierarchy, power, privilege, class differences and distortions. On the one hand, the ethics of critique helps us to build, for example, ethical work environments. On the other hand, the ethics of criticism can reveal unethical processes in an organization. *The ethic of justice.* Starratt says that we govern ourselves by adhering to justice, more concretely we treat each other according to a uniformly applied standard of justice. Ethics is thus built from practice within the community. This aspect of the model addresses the responsibility of smarter students, suggesting that they share their gifts for the benefit of the community, for example by tutoring their peers. Overall, it covers issues such as resource allocation, responsibilities, rights, fair trial, assessment, and equal access. *Ethics of caring.* The ethics of caring implies loyalty to the other person and openness and respect to accept the other person for who he or she is. This kind of ethics goes beyond

organizational effectiveness, so people, employees, are seen more as mere means to a productivity goal. The ethic of care closes the loop of the model at this point. This factor deals with quality of life, individualism, loyalty, human dignity, and empowerment. A summary of the model is shown in Figure 1. Later Shapiro and Stefkovich (2005) suggested adding a fourth factor, the ethic of profession, which addresses the specific ethical characteristics of a given field, professional ethics and the integration of individual, personal ethical rules.

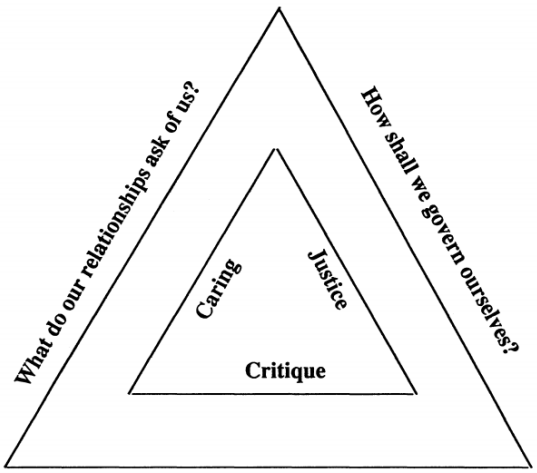

Figure 1. Structure of Starratt's model (1991, p.199)

Geert Hofstede (1980), as a result of an empirical study covering more than 40 countries, was able to identify 4 dimensions along which differences in international cultures can be captured; these are (Hofstede, 1980):

1) Individualism-collectivism (IDC): the social norms of the relationship between the individual and the community of the individual and the individual's relationship with others, values for living together.
2) Power distance index (PDI): The power distance between the leader and the subordinate in a hierarchy is equal to the difference between the leader's ability to determine the subordinate's behavior and the subordinate's ability to control the subordinate's behavior.
3) Masculine-Feminine values (MAS): the behavior expected of women and men varies from culture to culture, but the men are generally expected to be dynamic and purposeful, while women are expected to be primarily women are expected to be more dynamic, dynamic and driven.
4) Uncertainty avoidance index: measures the degree of adherence to rules (UAI). The way we cope with uncertainty is partly personality-dependent, but it is built into our behavior through socialization in a given society and we learn to conform to norms.

He first created the above 4 dimensions, to which he later added 2 more (Hofstede, 2001): one is Long Term Orientation vs. Short Term Normative Orientation (LTO): the time orientation of society is determined by long or short term thinking. The other one is Indulgence vs. Restraint (IND): how much they try to control their desires, their impulsivity. Hofstede (2011) found that the distance of power and the avoidance of uncertainty have a particularly strong influence on the type of organizational structures that emerge in a country. The difference in group phenomena is best explained along the lines of individual vs. collective and small vs. large power distance.

Generation Z: The Oxford Dictionaries define Generation Z as "the group of people who were born between the late 1990s and the early 2010s, who are regarded as being very familiar with the internet." The members of this generation are characterized: Zoomers, digital natives (e.g. Turner, 2015), but not always digitally literate (Strauss, 2019; Dobos et al., 2022), risk-averse (Economist, 2019), more sensitive against systemic racism and has modern views on gender identity (Schroth, 2019), outcome-focused, tech-savvy (Kebritchi et al., 2016; Tuluk & Yurdugul, 2020), naturally use the smartphones and Internet (Francis & Hoefel, 2018; Hebebci & Shelley, 2018), moral issues are also important for them (e.g. Zubairu et al., 2016) and social media has a huge impact on them (Wozniak, 2016; Duffett, 2017). It seems that they prefer autonomy at work (Wiedmer, 2015; Garai Fodor & Jäckel, 2022) and expect real-time – rather personal – feedback (Lazányi & Bilan, 2017), so we see that personal interaction is important for them despite obvious digitalization effects (Zhou & Shalley, 2003). They are pragmatic in e.g. length of working time, work-life balance, values of the organization, quick carrier development (Chillakuri & Mahanandia, 2018; Chillakuri, 2020)

To explore the publications on ethics, and more specifically on ethical leadership among Generation Z, we use of a large, reliably high-quality database, which gives us a good chance to learn about publications and research trends on a given scientific topic. For this purpose, the internationally known and recognized Web of Science database was examined. In general, the topic of "ethical leadership" is very popular among researchers, with Web of Science providing 6428 hits for this keyword. If we narrow this down to publications in the social sciences, we still get 3158 results. Next, we searched for the terms "ethics" and "Generation Z" without any time constraints, and found 29 hits. However our topic is perception of Generation Z about ethical leadership therefore we have made a new search for "ethical leadership" and "Generation Z", and we found a total of 1 publication. The focus of this paper (Evans et al., 2021) is on the impact of helicopter parents and the workplace ethics of the Generation Z youth concerned, where the authors provide recommendations for the Millennial generation managers who lead them. So this article is not primarily about ethical management of Generation Z either. This suggests that the ethical perceptions of Generation Z, especially their perceptions of ethical leadership, are a rather under-researched topic. On the one hand, the young age of Generation Z is a natural explanation for this, but it is important to add that the oldest members of Generation Z are already 26-27 years old, who have not only just entered the workplace, but are often already in a leader position.

Based on literature review the hypotheses of our study are:
H1: The Starratt model is valid for Generation Z.
H2: Generation Z in Hungary tends to avoid conflict in terms of workplace ethics.
H3: In ethical leadership Generation Z in Hungary takes an individualistic approach.

Method

More scholars (e.g. Scanlan, 2007; Osafo et al., 2021) used Starratt's model in their empirical research on ethics and found it useful. Therefore our empirical research used the Ethical Leadership Questionnaire of Langlois and co-authors (2014), who also applied the three elements of the Starratt model. They asked leaders in higher education, and we asked Generation Z undergraduate students. The Ethical Leadership Questionnaire was divided into 3 groups, with each item measured on a six-point Likert scale. The first group of items was about the respondent's own perception of ethical issues at work; "When I reflect on the way I act at work, I can see that..." The second group was about how the respondent solves ethical problems at work, while the third group focused on what criteria the respondent uses to make a decision when faced with an ethical dilemma. The English questionnaire was translated into Hungarian and finalized after testing. In our research we investigated the relationship shown in Figure 2 using Langlois' questionnaire and Starratt's model. For this purpose, we sent a link to our questionnaire to 3000 undergraduate students with work experience in the faculty of economics and management at a Hungarian university, and received 143 responses.

Limitation of our study: Due to the small sample size, the results of our study cannot be generalized to the population, the Hungarian Generation Z youth or university students. However, we consider our empirical results to be significant due to the high degree of under-research on the topic.

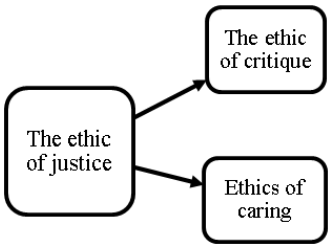

Figure 2. Model tested based on Starratt (1991)

Results and Discussion

First we introduce our demographics. As it can be seen in Table 1 69 of 143 respondents are men, 73 women and one student chose option 3. In this research we focus on Generation Z that's why use valid data of BSc students, so 1 means 18-21 years and 2 means 22-25 years (see Table 2). A link to the questionnaire was sent out to a university faculty of economics and management, but some students (undergraduates with work experience) who are not economics students also filled in the questionnaire. This is how the distribution of

respondents by education was obtained: Economic, business and management: 132 respondents (92.3%), Engineering sciences: 4, Health and Human Services: 1, others: 6.

Table 1. Gender distribution of respondents

	Gender	
	Frequency	Percent
1	69	48.3
2	73	51.0
3	1	.7
Total	143	100.0

Table 2. Distribution of respondents by age

	Age	
	Frequency	Percent
1	83	58.0
2	60	42.0
Total	143	100.0

Table 3 shows the Cronbach's alpha values, suggesting that the questionnaire is reliable. Examining the VIF values, we saw that there is no multicollinearity.

Table 3. Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Care	0.838	0.864	0.823
Critique	0.790	0.803	0.785
Justice	0.728	0.726	0.719

Smart PLS4 software (Consistent PLS-SEM algorithm) was used to analyses the data. The three factors include the following items:
Care = 1, 2, 5, 8, 9, 17, 18, 19, 20, 21
Critique = 3, 6, 7, 10, 11, 16, 23
Justice = 4, 12, 13, 14, 15, 22

Table 4. R-square matrix

	R-square	R-square adjusted
Care	0.568	0.565
Critique	0.584	0.581

In multivariate regression, the strength of the relationship between the variables is R^2 is the multiple correlation coefficients, also known as the multiple coefficient of determination squared. According to Chin (1998) if R^2 values are 0.67 those mean substantial variables and our values (Critique: 0.584 and Care: 0.568) are close to this. (See Table 4, Table 5, and Figure 3)

Table 5. Path coefficients

	Path coefficients
Justice -> Care	0.754
Justice -> Critique	0.764

The following statements received the largest outer loadings:
Critique:
16. When I have to resolve an ethical dilemma, I try to oppose injustice.
23. My decision in the resolution of an ethical dilemma is based on greater social justice.
Care:
20. When I have to resolve an ethical dilemma, I pay attention to individuals.
18. When I have to resolve an ethical dilemma, I seek to preserve bonds and harmony within the organization.

The factor 'ethic of justice' (how we govern ourselves) is significantly influenced by the factors 'care' (what our relationships want from us) and 'critique' (who we control). We see that Starratt's 3-dimensional model is also

valid among the surveyed Generation Z young people with work experience that's why we accept H1. Catacutan and co-authors (2015) also found the 'care' and 'justice' factors to be dominant in their research in the Philippines, interviewing deans. In this respect, it seems that the younger generation does not behave differently.

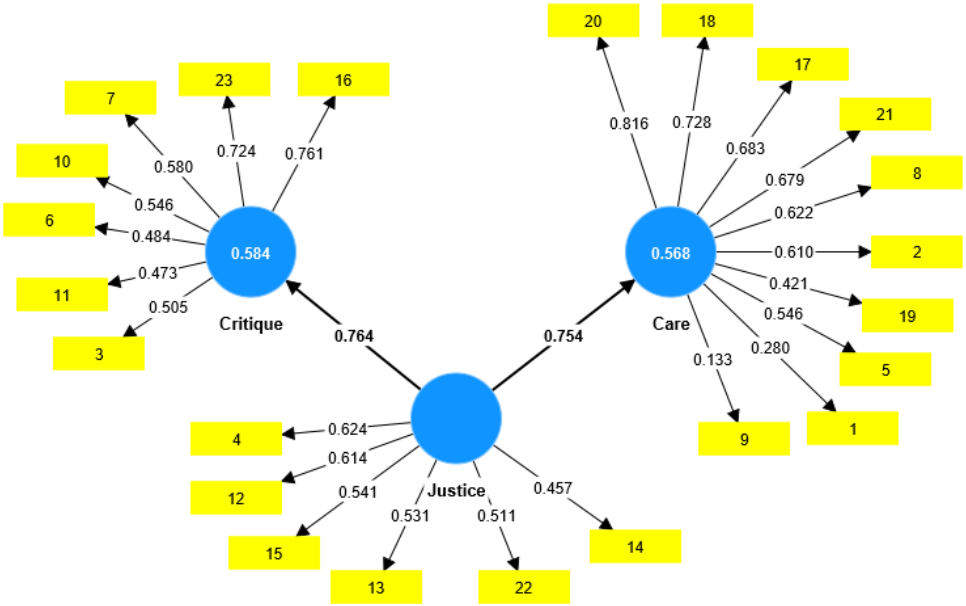

Figure 3. Results and the received SEM Model

The strongest components of the 'critique' factor show that our young respondents really want to do something about an ethical work environment, not by avoiding unethical practices but by confronting them. Additionally they want to achieve and work on the greater social well-being so we reject H2. The key statements of the 'care' factor address the needs of both the individual and the community in an interesting way. Thus, it cannot be said that the young people interviewed in Generation Z Hungary are individualistic at the expense of the community, but on the contrary; harmony at work is about as important to them as the well-being of the individual, and even the well-being of society. This is a surprising result, since, for example, according to Hofstede's model, these students would be somewhere in the very middle on the individual/collective (IDV) scale, although the Hungarian score of 80 indicates an Individualist society. Surprisingly, we reject our H3. In empirical research, Garai Fodor et al. (2022) also found that Hungarian students in courses prefer pair or group tasks.

Conclusion

There are many publications that address the fact that young generations think differently, communicate differently and have different expectations in the workplace. Indeed, through the integrated, natural use of new technologies, they behave and perceive their environment differently in many ways. But we also see, for example, that harmony at work is extremely important to them. A surprising finding is that community well-being, and indeed wider social well-being, is a much higher priority for them than expected. Further empirical research is also suggested on Generation Z's perceptions of ethics in the workplace, their behavior and their views on ethical leadership. A multi-country survey would be ideal, where globalization and national effects could be measured.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

Acknowledgements or Notes

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SSI: Teachers Make STEM Concepts Relevant to Their Students

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Abstract: Socioscientific issues (SSI) are ill-defined problems that teachers could use to make STEM concepts meaningful and interesting for their students. However, it is challenging for most teachers to plan and implement SSI in their classrooms because they lack the knowledge and teaching repertoire. We conducted a qualitative case study of five teachers to answer our research question: How did teachers' pedagogical content knowledge (PCK) of SSI develop by the end of the professional development program? Our analysis of interviews, video reflection, and lesson plans pointed to teachers' PCK of understanding of students and instructional strategies as they engage their students in identifying the issue, considering issue system dynamics, and comparing multiple perspectives (social aspects of SSI). Our findings supported the teachers' PCK model that Lee (2022) proposed particularly the knowledge of students' SSI learning and teachers' choices of teaching and learning strategies for a particular group of students. Specifically, the teachers in our case study were able to use SSI contexts such as GMO foods and effects of fast fashion (chemicals on manufacturing and discarding clothes) on water quality on students' motivation to learn about the scientific and ethical debates on GMOs and water resources. Moreover, a teacher was able to ask students to consider issue system dynamics such as habits, culture, lifestyle, costs, and income when examining different food choices. They were also able to engage students in developing, testing and analyzing scientific phenomena such as the effect of chemical dyes in clothing on water and genetically modified foods. They were able to incorporate elucidating one's position on SSI and employing reflective scientific skepticism in their lesson ideas. Finally, teachers in our study used videos, guided questions, town hall meeting presentations, investigations, and other active learning strategies with their students.

Keywords: Socioscientific issues, Teacher education, STEM, Pedagogical content knowledge, Lesson study

Introduction

The Socioscientific issues (SSI) based science education calls for the ethical and moral considerations of the issue at hand with an acute awareness of the impact on society (Zeidler, Sadler, Simmons, & Howes., 2005). SSIs draw from students' daily lives and call upon them to explore the connections between scientific phenomena and their historical, political, and social aspects. Albe's (2008) study of 11th graders found working with SSI was "very motivating for the students" (p. 85). Klosterman and Sadler's (2010) study of 83 high school students found their study "provides support for the use of SSI as a context for learning science content" (p. 1017). Tal and Kedmi (2006) found SSIs promote "higher order thinking skills of argumentation and value judgment, which are central constituents of decision-making processes" (p. 615). Zeidler et al. (2005) note SSIs are controversial issues where scientific inquiry calls for "evidence-based reasoning" (p. 698) and leads to

"character formation/conscience building" (p.698). Scientific knowledge in SSI classrooms is built through engaging students in scientific modeling (Peel et al., 2019) and scientific discourse (Zeidler & Nichols, 2009).

However, pre-service and in-service teachers face several challenges while planning and teaching SSI lessons in their classrooms. Walker and Zeidler (2007) note teachers need professional development to gain the "pedagogical techniques necessary to create content-specific and NOS-embedded learning activities that emphasize discourse and debate" (p. 1405). Zeidler (2016) notes most of the current STEM programs are "conceived and entrenched in science, technology, engineering and mathematics siloes and then one moves to the "crosscutting connections among the areas" (p. 17). Undermining the development of scientific literacy. Macalalag, Johnson, and Lai's (2020) study of 24 pre and in-service STEM teachers noted the planned "instructional activity may not engage students in broader socioscientific and cultural contexts or perspective taking" (p. 390). thus impacting student scientific literacy development. Teachers in Johnson, Macalalag, and Dunphy's study struggled with "incorporating scientific argumentation through SSI cases" (p. 1) and the teachers in Macalalag and Parker's (2016) study struggled with certain science concepts (motion and energy), inquiry (planning the investigation), and engineering design (identifying constraints).

Minken et al. (2021) found teachers in their study struggled to ask guiding questions that would have helped students determine the credibility of the sources of information ("reflective scientific skepticism", p. 137). The researchers concluded teachers needed help to support student claims of SSI understanding with evidence. Previously Minken et al. (2020) described how elementary teachers implemented SSI in their classroom instruction and the effects it had on student learning. They found that over two-thirds of pre-service and in-service teachers who had not previously taught lessons involving SSIs expressed an intention to do so at the end of a workshop on the SSI framework. Macalalag et al. (2019) found that teachers became more focused on real-world examples of SSI, motivating students to learn STEM concepts and practices, and teaching by observing nature after participating in the STEM teaching methods course.

Barendsen and Henze (2017) noted that various elements of a teacher's pedagogical content knowledge (PCK) components (knowledge of goals and objectives, knowledge of student understanding, knowledge of instructional strategies, and knowledge of assessment, p. 1149) are interconnected but "can be investigated separately" (p. 1143). Their study of an experienced chemistry teacher found the teacher focused mostly on personal life as opposed to society (knowledge of content, under the goals and objectives category). The teacher's practice often differed from the plan, for example, while the teacher in this study noted they "monitor students' understanding by check questions" (p. 1162). In reality, the classroom practice was disjointed at the observer very few opportunities to check understanding and at the same time, the teacher often gave the answers before allowing students any time to think. In another example, the teacher noted they intend "to stimulate students to come up with questions" (p. 1162). But in the researcher's observation, they lectured predominantly. If and when students wanted to contribute to the issue at hand, their contributions "tended to be ignored of cut off" (p. 1162). Thus demonstrating the deep need for professional development.

Bayram Jacobs et al. (2019) noted teachers need to pay equal attention to "science content and SSI skills" p. 1207), which means they need to have a good understanding of student difficulties and repertoire of "appropriate instructional strategies" to teach SSIs. Bayram et al. (2019) argued for PD and curricular materials to help teachers develop the needed pedagogical content knowledge PCK) to teach SSIs. Some strategies noted in this study include "argumentation, discussion (including ethical and religious aspects), and group work" (p. 1220). Teachers also used various "pedagogical tools" (p. 1220) such as decision-making tools and tools to support development of explanations. To answer some of these challenges, we conducted a qualitative case study to answer the following research question: How did teachers' pedagogical content knowledge of the social, scientific, and discursive components of SSI develop by the end of the professional program?

Teachers' Pedagogical Content Knowledge (PCK) of SSI

According to the NRC the teachers' "special understandings and abilities" (1996, p. 62) that coalesce as their knowledge of the students and student learning, the teaching and learning of the science content and curriculum is the teacher's PCK. This very PCK enables teachers to adapt teaching to the target student populations. Bayram-Jacobs et al. (2019) write, "Teacher knowledge is an indicator of the quality of instruction and teacher behavior in the classroom" (p. 1209). PCK helps teachers' better use the content knowledge to explain concepts for example, Kulgemeyer & Riese's (2018) study of 198 German pre-service teachers found "PCK mediated the path of CK to the teaching quality in explaining situations" (p. 1413).

The pre-service teachers in Beyer and Davis's (2012) study were tasked to critique and adapt inquiry-oriented science lesson plans and curricular materials. The researcher noted, "With support, novice teachers are able to develop and apply their PCK" (Beyer & Davis, 2012, p. 152). But, these teachers also struggled with assessment (focusing on assessment of science concepts, p. 151), strategies to include all students, and knowledge of the science curriculum (p. 143). For example, teachers had "alternative ideas about what and how to assess" (p. 143), but most also failed to provide opportunities to apply learning to "new task or situation" (p. 143). Teachers held "naïve ideas" (p. 145) and assumed the curricular materials were "aligned with standards" (p. 145), thus failing to check standards and alignment for themselves. Most of the teachers also failed to help students connect science to the student's "personal, cultural, and/or social experiences" (p. 145). They almost always provided the definitions of various terms at the start of the lesson, in contradiction to how NGSS (2013) expects science lessons will be facilitated. The teachers struggled with inquiry for example, they did not understand what "making predictions during investigations" (p. 146) meant, interpreting it as eliciting the student's prior knowledge instead. They also did not have a good understanding what creating evidence-based explanations or how to go about it (p. 146). Beyer and Davis (2012) found "teachers' PCK improved significantly" (p. 130) with multiple practice opportunities.

Lee (2022, p. 305) describes a model of PCK for teaching SSI where the content knowledge (CK) to teach SSI informs the teacher's orientation for teaching SSI (OTS). This OTS is further connected to the teacher's knowledge of instructional strategies for teaching SSI (KIS); knowledge of curriculum (KC); knowledge of student SSI learning (KSL); knowledge of learning contexts (KLC) and knowledge of assessment of SSI learning (KAS) (Lee, 2022, pp. 305-306). The CK is informed by the teacher's knowledge of the nature of science and knowledge of cutting-edge science and technology. Astutely, teachers are aware of the perceptions of parents, peer teachers, and school administrators on the chosen SSI, they are also aware of the availability of time, quality, and availability of resources to implement the SSI, this represents the teacher's knowledge of learning contexts (KLC) (Lee, 2022, pp. 307-308). Learning about SSI can result in teachers' desire to implement the framework.

The 15 pre-service Korean teacher participants in Lee's (2022) study struggled with creating "SSI scenarios" (p. 311). For example, although they understood the scientific content, they could not link the science to the "social and moral connotations" (p. 313) of the issue at hand. They also struggled with seeking multiple perspectives, for example, they would divide students into pros and cons to debate SSI issues (p. 314). They also struggled with classroom discussions. For example, if the students brought up unexpected items, the teacher got "lost in the question of how to support students in moving forward" (p. 317). The students came up with "limited information" (p. 317) so debates were of a lower quality and the teachers learned they needed to better facilitate student searches and reasoning. At the conclusion of the study, the pre-service teachers reported they were better prepared to teach SSI lessons (p. 324) by participating in the SSI-grounded teacher education program (p. 301).

Research Methods

We conducted this qualitative case study (Marshall & Rossman, 2011) in order to answer our research question: *How did teachers' pedagogical content knowledge of the social, scientific, and discursive components of SSI develop by the end of the professional program?* This study built off of prior research conducted over the course of the Integrating STEM in Everyday Life conference series. For a more detailed explanation of the conference series, please refer to our previous work (Macalalag et al., 2019, 2020). To answer our research question, we analyzed interview, video reflection, and lesson plan data gathered from five teachers who participated in the Integrating STEM in Everyday Life conference series. This study took place over the course of a 15 month-long professional development conference series comprising one kickoff conference event, a series of four intensive workshop sessions, followed by a culminating conference event. At the initial kickoff conference, we introduced the SSI framework and recruited 29 predominantly secondary STEM teachers to participate in our intensive workshop series, during which participants deepened their PCK of SSI by developing and implementing SSI lesson plans. At the culminating event, participants in our intensive workshop series developed their own workshops that they presented to other educators from outside that program.

Participants in this study included five in-service grades Kindergarten to 12 teachers from urban schools in the northeast of the United States of America. These teachers were selected in part because they represent a variety of experience, content area, grade level, and sophistication in their SSI lesson plans and because they volunteered to create video reflections. Teacher experience ranged from teachers with less than a decade of experience to those with over three decades of experience. The selected participants represented content areas including Mathematics, Science, English, and Special Education.

Data for this study came from three sources: interviews, lesson plans, and video reflections. While all (n=5) study participants submitted a final lesson plan and a video reflection, only three volunteered to participate in interviews. The final lesson plans were developed by teachers in collaboration with peers and an assigned university faculty mentor to incorporate the socioscientific issues framework (Sadler et al., 2019) into their teaching practice, and were collected from teachers' shared google folders after the end of the professional development program. Near the end of the program, we asked teachers to complete video reflections, which were screencast presentations from teachers that elaborated on the successes and challenges of their SSI lesson development and implementation. Finally, teachers were recruited for qualitative, semi-structured interviews at the conclusion of the professional development program. During these interviews, teachers provided insight into their knowledge, experience, and thinking around the three components of SSI (social, scientific, discursive). The social components of SSI consisted of identifying the issue, considering issue system dynamics, and comparing and contrasting multiple perspectives. These were considered social codes because they revealed the degree to which the lessons considered political, moral, cultural, and ethical components of the problem (Zeidler, 2016), citizenship education (Barrue & Albe, 2013) and values (Lee et al., 2013) class. The scientific components of SSI, knowledge of scientific phenomenon and STEM modeling, were designated as such due to their scientific nature. Finally, the discursive components of SSI included employing reflective scientific skepticism and elucidating their own position/solution. In analyzing the lesson plans, teachers were given a score of 1-3 for each code in the social, scientific, and discursive components based on their level of sophistication according to our previously developed SSI rubric (Minken et al., 2021). This score was then scaled for ease of comparison by converting the score to a percentage of total possible points in a given component: since there are three codes each for social and scientific, these both had a maximum score of 9, while the discursive components of SSI consisted of only two codes, giving a maximum score of 6.

Findings

As shown in Figure 1, teachers in this study evidenced varying levels of sophistication in their lesson planning across the different domains of SSI (i.e., social, scientific, discursive). All teachers showed more sophistication in their planning of the social components of SSI than in their planning around the scientific and discursive components. However, while levels of sophistication in planning scientific components of SSI were only slightly less (within 22%) than the social components, all teachers showed relatively minimal evidence of sophistication (< 50%) regarding the discursive components of SSI. This suggests that the primary focus for teachers in their lesson planning was on the social and scientific components, as opposed to the discursive components of SSI, such as reflective scientific skepticism and elucidating one's own position or solution with respect to the SSI. In the remainder of this section, we describe some examples of teachers PCK with respect to the social, scientific, and discursive components of SSI.

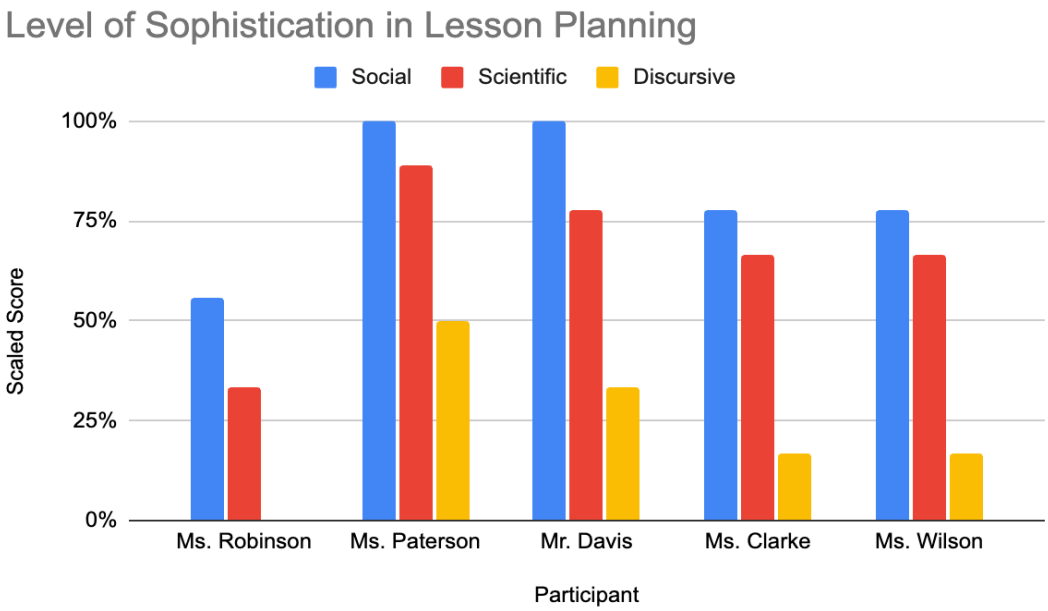

Figure 1. Level of sophistication in lesson planning across social, scientific and discursive domains.

Social Components of SSI

Our analysis of lesson plans showed social components of SSI such as identifying the issue, considering issue system dynamics, and comparing and contrasting multiple perspectives. For instance, in the lesson written by Ms. Paterson (pseudonym), she asked her students to create a campaign to argue for or against genetically modified organisms (GMO) foods in schools. "You have been hired as a Marketing Representative for a local politician from our city who is running for office. S/he wants you to help her/him to create a campaign arguing for or against GMO foods in our schools. Provide research based arguments to back up her/his claims. Support your ideas with mathematics, i.e. probability, graphs, etc." Ms. Paterson used the issue of GMO foods to elicit what her students know about it and to use mathematics to communicate their ideas. Her lesson plan also included asking students to consider system dynamics: "Policy makers will need to decide if the claimed benefits are worth the costs to public and private funding sources, and to families purchasing meals. We are all, for obvious reasons, very aware of and concerned about the food we eat, though differences in habits, culture, race/ethnicity, and lifestyle, in addition to income and cost considerations, lead to very different food choices across the United States." In this example, Ms. Paterson asked her students to think about different systems such as income, costs of food, culture, lifestyle, and others when arguing for and against GMO foods.

Our analysis of data on the social components of SSI also pointed to teachers' PCK of understanding students. For example, Mr. Davis mentioned in his interview about the possible struggles of students to understand individual actions and to explain why people accept or ignore evidence: "I think they're struggling to differentiate between what actions people take, for whatever reasons, and what actual data-driven evidence-based decisions would be like. Or what they are. That just because a leader doesn't do something, doesn't mean that it's the right thing to do. They are following the appeal to authority and that won't necessarily lead you to the correct decision." Mr. Davis pointed out that students struggled whether to accept or not explanations or decisions made by people in power. In addition to PCK of understanding students, our data analysis showed teachers' PCK of instructional strategies toward teaching SSI. For instance, Mr. Davis mentioned in his interview the different instructional strategies he used to teach about the GMO foods debate. "I started off by allowing the students to just voice their own opinions and views on GMO foods, about would they eat them or not, do they not pick foods for that reason, etc. and then, to include multiple perspectives, I assigned them different societal roles in different situations and they also had to decide whether they were going to grow GMO foods in their hypothetical country or area…" In addition to asking his students to voice their own positions and research on multiple perspectives, they had to defend them using evidence: "…in each step where we had a discussion, there would be critical stakeholders represented by the students, and they would have to think about and research what roles those stakeholders might have and what positions they would have, and then defend them, even if they were not aligned with the students own perspective on the topic…What is the argument, what is the evidence, and why is that evidence not compelling for you?" Students also worked in groups while doing these activities in class.

Scientific Components of SSI

We saw scientific components of SSI and teachers' PCK of understanding students in our analysis of data. In the lesson plan written by Ms. Clarke, she mentioned possible conceptions and alternative conceptions of students with regards to water use and chemical pollution from clothes we wear. For example, students may or may not know how their household and daily use of water could impact others and how chemicals on clothes they wear could affect water quality. "Students may have a hard time conceptualizing how water usage in Philadelphia could impact someone else in the neighboring towns and/or cities. Students may need to be scaffolded through different parts of the lesson depending on whether or not they have had some real-world experience with the issues discussed. I.e., they may have limited experiences buying their own clothes so they are not aware of how much things cost, etc." In this lesson on fast fashion, Ms. Clarke hopes to have students examine the chemical dyes used to make clothes and how manufacturing and washing of clothes could impact water quality. In terms of teachers' PCK of instructional strategies, Mr. Davis used a video and guided questions on Super Salmon to engage students on SSI on classical vs.transgenic breeding. Some of the guided questions included: "What allows transgenic salmon to grow in winter? What are some possible consequences if transgenic salmon escape from their pens into the ocean population? How might transgenic salmon affect the evolution of other salmon populations?" These questions will allow students to analyze what they saw on videos and elicit their knowledge and position with regards to transgenic breeding. In addition to using video and guided questions, Mr. Davis shared during his interview using hands-on investigation, analysis, discussion, and reading articles as instructional strategies to examine an SSI. "They would have this activity where they're going around the room and if they're within six feet of each other, they have to exchange the water in the cup or

spray each other with the spray bottle a little bit and then after like 10, 15, 20 minutes, we would put the blacklights on and they could see where the blacklight stuff had spread, and you could see that with one student, how far the stuff had spread." Mr. Davis is using this investigation to show "how easy it is for things that are contagious to spread.. from one person to another." These examples exemplified teachers' PCK of instructional strategies as they teach scientific components of SSI.

Discursive Components of SSI

Our data analysis also showed discursive components of SSI such as employing reflective scientific skepticism and elucidating their own position/solution. In terms of teachers' PCK of understanding students, Mr. Davis mentioned during his interview that it is beneficial for teachers to hear students' point of view on SSI that they are learning. "I think the framework is beneficial for so many scientific concepts and allows students to say what they think, to voice that and defend it, and then to challenge them with other points of view." He continued by saying that this process will allow students to explain their ideas and listen to others. In addition to elucidating one's position, Ms. Robinson mentioned the importance of questioning the credibility and sources of information. "You just have to talk to them about reliability and whether or not the articles are valid and how to determine that, and where the sources are coming from… Because a lot of times the magazines and articles that they're gonna get are not gonna be scientific articles or science based articles from some kind of a journal, so you need to start making them aware of the types of sources and figuring out which ones are valid and not valid." The ability of students to evaluate claims or explanations and to look for potential biases are part of scientific skepticism. In terms of teachers' PCK of instructional strategies within the discursive components of SSI, Ms. Paterson described how she would help students to review their sources by using a checklist while conducting library research. "So I would provide students with practice on how to find and use resources for answering questions or solving problems, using perhaps a checklist, which shows the credibility of the source. So asking them questions such as, as they're reading, I could ask them: 'Is the information relevant? Is it current? Is it accurate?' Ask them questions about the author: "Is the author an expert, a scholar on the topic? Are there any biases given?" According to Paterson, using this checklist will help her students to examine and discuss sources of information. Another instructional strategy proposed by Ms. Clarke was to engage students in a scenario of presenting their position and information to a city council. "As a member of the City Council, you will be asked to pick a side of this issue and create a presentation on it to influence the rest of the Council. Back it up using research from the internet. We will then vote as a class on the presentations and write a letter to the City Council sharing our insights." This scenario is a good example of discursive components of SSI such as employing reflective scientific skepticism and elucidating their own position/solution.

Conclusion and Discussion

SSI are real-world, ill-defined problems that teachers could potentially use to engage and motivate their students to learn STEM concepts (Zeidler, 2016). However, it is challenging for most teachers to plan and implement SSI in their classrooms because they lack the knowledge and teaching repertoire (Macalalag, 2020). We conducted a qualitative case study with five teachers in order to answer our research question: *How did teachers' pedagogical content knowledge of the social, scientific, and discursive components of SSI develop by the end of the professional program?* Our findings supported the teachers' PCK model that Lee (2022) proposed particularly the knowledge of students' SSI learning and teachers' choices of teaching and learning strategies for a particular group of students. Specifically, the teachers in our case study were able to use SSI contexts such as GMO foods and effects of fast fashion (chemicals on manufacturing and discarding clothes) on water quality on students' motivation to learn about the scientific and ethical debates on GMOs and water resources. Moreover, a teacher was able to ask students to consider issue system dynamics such as habits, culture, lifestyle, costs, and income when examining different food choices. Similar to the work of Westbrook and Breiner (2019) who engaged their teachers in discussing the water quality crisis in Flint, Michigan, our teachers were able to use real-world examples to motivate students to learn concepts in science and mathematics. We saw that our teachers were able to help students not only to voice and defend their opinions, but also evaluate claims and evidence presented to them as part of scientific skepticism. In terms of teachers' PCK of instructional strategies, teachers in our study used videos, guided questions, town hall meeting presentations, investigations, and other active learning strategies with their students. Such PCK points to the knowledge of teachers to enact suitable teaching pedagogies for their students (Shulman, 1986; van Driel et al., 1998).

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Identifying Human Temperament and Character Type for E-Learning Needs Using a Fuzzy Logic Approach

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Abstract: Today, online training and counseling is becoming increasingly popular. This has been achieved through the use of various successful information and communication technologies and electronic tools - Electronic (ICTE). Therefore, significant changes are needed in the training process. People have different perceptions of information and different types of temperament. That is why the training process should be tailored to the needs of each. The training system should take into account that people have different styles of perceiving information according to the temperament and character type of the student-aplicant. This would reduce online training and increase its quality.Traditional psychometric tests are usually very long and difficult, based on a person's opinion of themselves and thus, they give different results depending on the person's mood. Also, depending on the mood and need, the person may be manipulated by possible answers. This is because the answers to such test questions are largely based on ongoing processes in consciousness. So from traditional tests there are other types of tests separately from questionnaires: drawing, colors, geometric figures, pictures, card games, numbers, scenarios, manuscript analysis, drawing and other tests. A special advantage of these types of tests is that they rely more on ongoing processes in the subconscious and are therefore more free to manipulate, while also requiring significantly less time and less dependent on mood.Autors task was to combine several other types of tests and create a free test-short program with the ability to present and process subjective information using modern fuzzy technology, which would allow us to determine the applicant's temperament and character type for e-learning and other needs.

Keywords: E-learning, Human temperament and charaqter type, Tests, Fuzzy logic, Individualization of e-learning.

Introduction

Let's take a look at one of the most modern approaches to determining the applicant's temperament type, which uses Fuzzy set theory approaches to process subjective information - this is the agent-based simulation model for character and perception guessing (Lauberte & Ginters, 2008; Ginters et al., 2011; Lauberte et al., 2010). Agent-based model TemPerMod can be used as a separate tool and as an integral part of the e-learning system. The study was launched at the Institute of Socio-Technical Systems Engineering in 2008 with a new e-learning technology that reports on the temperament and character type of the student-intern. The agent-based TemPerMod model is designed to determine a person's temperament and character type, as traditional tests are long and the irritant and applicant can manipulate the answers.

Agents-based model TemPerMod aims to identify temperament <T> and character type <P> types. This will be determined by the combination of attributes <A>, where C is a favorite color, F is a favorite form, Act is a favorite activity, and S is a favorite expression. Added to this is another attribute - dimension <D> and the user can select 2D or 3D visualization during simulation.

The term "agent-based simulation" refers to a special type of simulation that has two essential components - agents and the environment, where agent behavior is the result of rules that predetermine the interaction between agents and their environment. The environment has some autonomy, e.g. a certain level of independence from what agents do, but it can also be influenced by their behavior. The type of perception is recognized by the agent-based simulation model, rather than the traditional questionnaire (Cirulis & Ginters, 2010).

Agent-based simulation model TemPerMod consists of three levels; At the first level, the specialist can change the appropriate attributes of each type of temperament. E.g. It is possible to identify some attributes from the pre-compiled list - shape, color and activity (Cirulis & Ginters, 2010). This can be done with the Agents & Games Configuration Module. The second level is the main part of TemPerMod. The model desktop (visualization room) is a square shape (box) and is divided into four frames (spaces). Each frame has an equal number of agents that have the same shape and color. At the beginning and end of the simulation session, applicants should answer a few short questions that appear on the screen using the popup (Cirulis & Ginters, 2010). The third level is designed for specialists who can plan or select simulation games or scenarios using existing agents. These games can be additionally used to determine the results. This can also be done using the Agents & Games Configuration Module.

The good thing about agent-based simulation is that the agent can make decisions independently. It requires more activity from agents than passivity. Most agents are characterized by the following: they are flexible autonomous rings and can interact with other agents and the environment. They can be goal-oriented, able to learn and adapt to their behavior based on experience.

Agent-based modeling is becoming increasingly acceptable in many areas of the social sciences because it offers a natural way to describe and analyze people. It is possible to simulate and manage a larger number of important factors, which is practically difficult to do when using another simulation platform (Macal & North, 2007). But this approach also had serious disadvantages. The main thing is the following: the agent-based model TemPerMod also has several limitations:

- This model has only one purpose: to determine the type of temperament and character type of the applicant's.
- TemPerMod requires a serious computer resource (otherwise there will be a jump-jump in the process of simulation).
- The agent-based TemPerMod model is quite long (125 cycles in total), so it is difficult to pay attention to the simulation, especially in the case of choleric type.

The TemPerMod result was compared with the Jung Typology test results with the Soloman and Felder questionnaire. TemPerMod matches the Jung Typology test, which defines phlegmatic people by 75% and melancholics by 71% (Keirsey, 1998), but the comparison does not match in the sanguine and choleric groups. This is a significant drawback. In addition, this approach does not define secondary temperament, while even before that Dellinger (1996) coined the term "psychometrics" and explained not only how to define your own character, but also how to use geometric psychology for any person's beliefs, values. She believed that there are five characters in us, but we have one dominant character and one secondary character that we use mostly, all the other characters are slightly represented inhus. Literally one of the founders of psychometrics in other terms, but clearly stated that the temperament (character type) of any person is a fuzzy set, the maximum value of membership function which belongs to the dominant character, the less to the secondary character, and the smaller the corresponding attributes. This is also completely natural, because a person is not of such a simple psychology that only one temperament (character type) acts at all times and in all situations. Thus, when we want to determine a person's (applicant's) temperament (character type), we need to be able to determine the appropriate fuzzy set of temperaments.

Problem Setting and Solution

The aim of present work was to create a program system for determination temperament and perception type of an applicant, according to the processing of the datas obtained by debriefing of the applicant. Because of specificity, inaccuracy and uncertainty, modern fuzzy informational technologies, based on fuzzy logic, are used. The temperament (character type) of any person (applicant) is defined as the corresponding fuzzy set defined on the five types of Dellinger’s characters.

The most common classification of temperament is also the oldest. It was introduced by Greek healers Galen and Hippocrates, who defined four main groups of temperaments: sanguine, choleric, phlegmatic, and

melancholic. There are many other classifications available today, but the authors realize that this is the best old-fashioned approach. There are many tests to temperament and character recognized. The most popular traditional and scientifically recognized test is the Jung Typology test, which is based on the typology of Carl Jung and Isabel Myers-Briggs and The Keirsey Temperament sorter (Dellinger, 1996; Keirsey, 1998). The Jung Typology Test consists of 72 questions, all of which have only one possible answer "yes" or "no". This test is a formula that conforms to the typology defined by Carl and Isabel Myers-Briggs and includes the unity of the defined characteristics of each type. Keirsey Temperament sorter is based on Keirseys temperament theory. The test consists of 71 questions, each with two possible answers.

As mentioned above, there are other types of tests apart from traditional tests - questionnaires: drawing, colors, geometric figures, pictures, card game, numbers, scenario, manuscript analysis, drawing and other tests. And yet, most of them are not quite accurate or require long testing. Of the many different approaches available in psychology today, we will use Suzanne Dellinger's approach to construct our system and classify temperaments into five groups: sanguine, phlegmatic, choleric, melancholic, supine. People can be classified according to their temperament or character type <T>. Each group has its own appropriate behavior or activity <Act> that matches the predefined color <C> and the shape of the favorite objects <F>. Also, there are two favorite expressions <S> for each group of temperaments.

$$<S>=(s_i) \text{ and } \quad i = 1, ..., 10$$

Favorite slogans of a choleric person are: "I always say what I think" and "Win as much as you want". Sanguine says, "Here and now!" and "The whole world is a stage and the sun is my light." Phlegmatic's favorite sayings are: "Peace at any cost!" and "Let's be friends". Melancholic: "Artist-poet, in search of kindred spirits ..." and "You have a problem, I - no", the fifth type of temperament - of Supine: "I answer with higher power" and "I will do everything for you, provided you do badly don't treat me like that". We can assume that color, shape, activity, and slogans form the plurality of attributes <A>. The purpose of this paper is to identify the applicant's temperament (character type) <T>:

$$<T> \leftarrow A(F, C, Act, S)$$

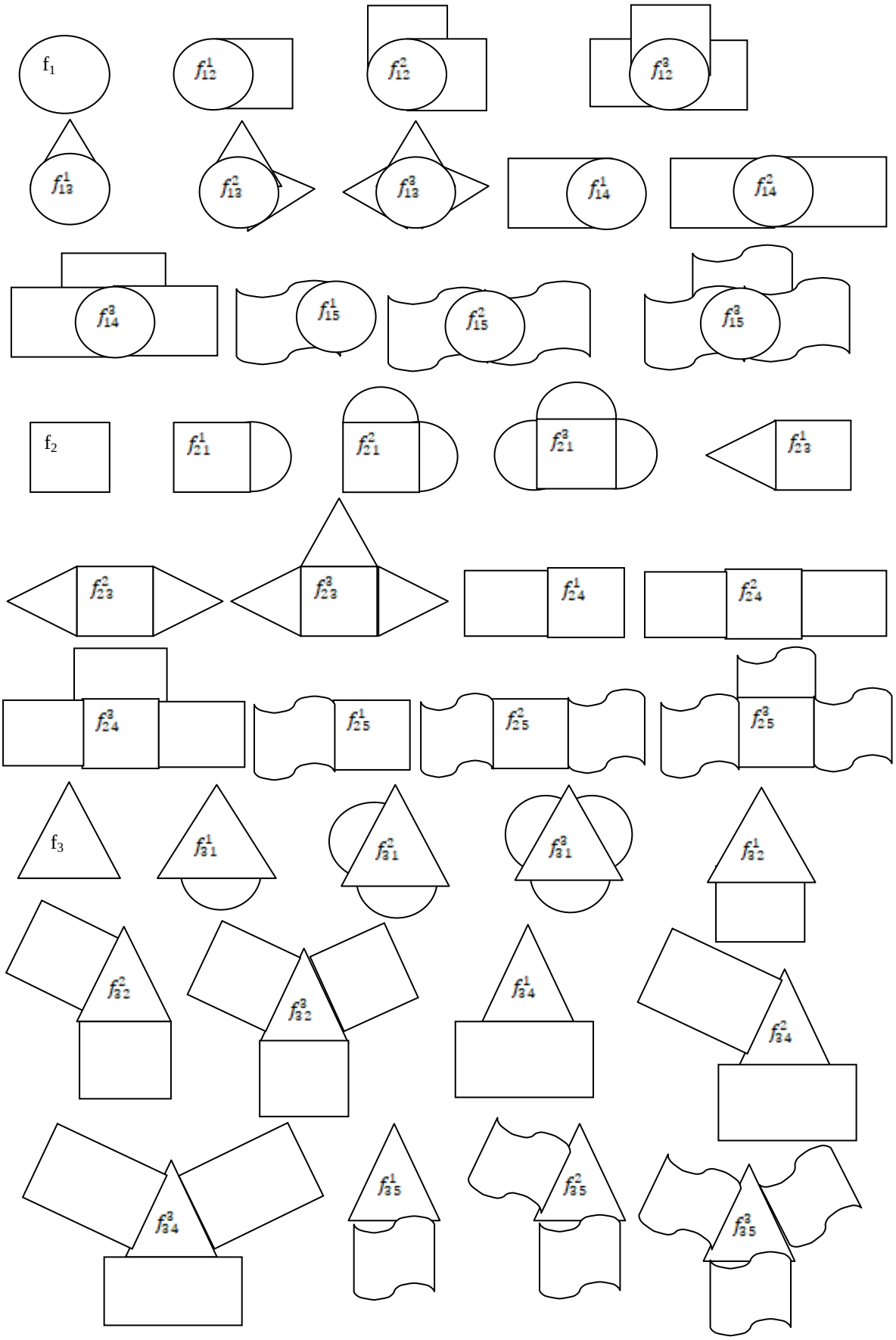
The relevance of each individual attribute color, shape, activity, and slogans to Dellinger's five types of human temperament (character type) is already well known through psychological experiments. The problem is how to combine the results obtained for individual attributes into the fuzzy set on five types of temperaments. To do this, you first need to fuzzificate these individual attributes by defining the values of the membership function in the terms of the corresponding linguistic variables, and then perform the applicant's polls on these linguistic variables. Finally, it is necessary to combine and transform the obtained results in the applicant's temperament (character type) fuzzy set with calculating the values of the membership function (otherwise levels of reliability) of it. As a result, we get a specific fuzzy set with appropriate levels of membership function (levels of reliability) defined on five types of human temperament (character type) that characterize the temperament (character type) of the concrete person (applicant). Existence of reliability levels allows us to determine both primary and secondary temperaments (character type) as well as other temperaments with low levels of reliability. Consider how the four selected attributes - color, shape, activity, and slogans - were fuzzificated.

Fuzzification of Figures

Dellinger (1996) believes that every shape that has a specific outline: circle, square, triangle, rectangle, and curling expresses any temperament (type of character) that exists in us, but we have one dominant and one secondary character that we use mostly. According to Dr. Susan Delinger, 83% of the <F> forms you choose are the ones that reflect your main f_k and secondary f_{kl}^p character Dellinger (1996).

$$<F>= \{f_k , f_{kl}^p\} \text{ and } k, l=1, \ldots, 5; \; p=1, 2, 3$$

Fuzzification of Color These forms are: circle {f1}, square {f2}, triangle {f3}, rectangle {f4}, curling {F5}. Obviously, we think this attribute is fuzzy, so instead of five figures, we will additionally present other combined figures to the applicant, which expands the choice of personality and corresponds to the simultaneous existence of the main and secondary temperament (character type) of a particular applicant. The figures part in the whole algorithm are as follows: first we present the main figures to the applicant - circle {f1}, square {f2}, triangle {f3}, rectangle {f4} curling {f5] to choose the one they like best.


f1
f2
f3

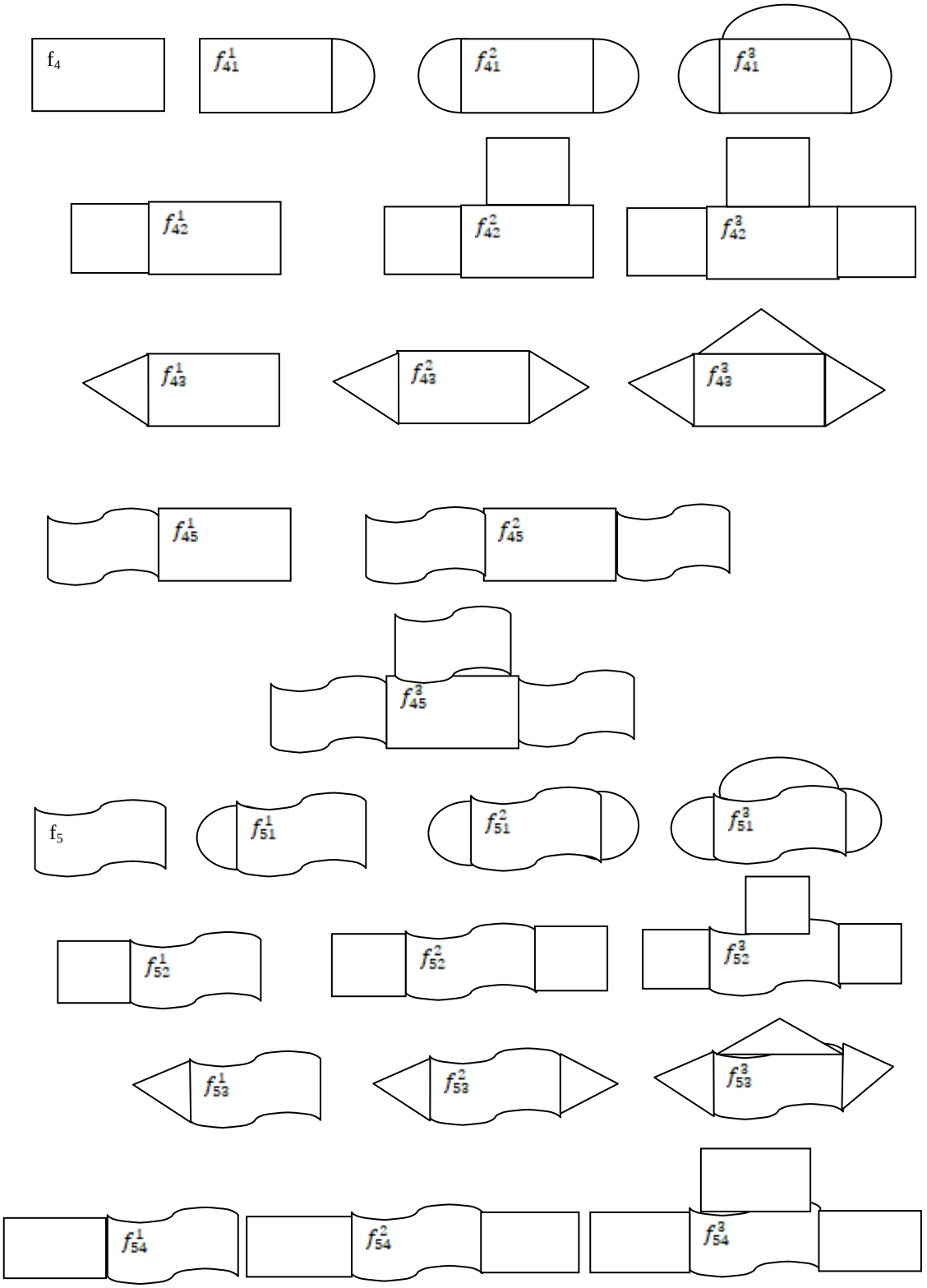


Figure 1. The type of main temperament (character type) and the type of secondary temperament (character type)

This will determine the main temperament (character type). Then we present the corresponding additional figures of the selected main figure to determine the secondary temperament or character. For example: if in the first step he chose a triangle {f3}, in the second step we present him with figures:

$f_{31}^1, f_{31}^2, f_{31}^3, f_{32}^1, f_{32}^2, f_{32}^3, f_{34}^1, f_{34}^2, f_{34}^3, f_{35}^1, f_{35}^2, f_{35}^3$, That is another 12 figures in each case, (See the picture below).

Let's see how we can calculate the values of the membership function. The values of the membership function of the main figure is always equal to 1, and in the case of the presence of additional figures they defined as follows: it is equal to as many quarters as the number of figures it has added of the other main figure. Otherwise, it is equal to a quarter of the top index function in the figure above - f_{31}^1 figure is equal to 0.25, f_{31}^2 is equal to 0.5, f_{31}^3 figure is 0.75, f_{32}^1 - 0.25, f_{32}^2 – 0.5, f_{32}^3 - 0.75 and etc. Similarly in the case of any other major figure. This choice determines the type of main temperament (character type) and the type of secondary temperament (character type) by the degree of its membership function - the levels of reliability. See Figure 1.

For fazzification of color we will rely an additive system introduced by James Maxwell - RGB (red, green, blue) in 1860 (CMYK, n.d.). This system now dominates the color reproduction (color production) systems of electron-beam tubes of monitors and televisions. This parameter is fuzzificated according to the frequency characteristic of the colors. Obviously, this attribute is fuzzy with us, so we present to the applicant 8 colors of the spectrum: red, orange, yellow, green, blue, blue, violet, purple - which expand the choice of personality and correspond to the simultaneous existence of main and secondary temperament (character type) in a particular applicant. The colors part of mine algorithm is as follows: The applicant will be presented with 5 of the 8 colors listed above - yellow, blue, purple, red, green, and will be given the option to choose one primary color that he or she likes. It will then be presented with the remaining 3 colors - orange, blue, violet - and will be given the option to choose one additional color. The first selection corresponds to the existence of the main temperament (character type) and the second corresponds to the existence of the secondary temperament (character type) of the given applicant. This choice determines the type of main temperament (character type) and the type of secondary temperament (character type) by the degree of its membership function - the levels of reliability. In addition to the three primary colors (red, green, blue), all the predatory colors are obtained by mixing different proportions of the primary and additional colors, as in CMYK color model. Therefore, the degree of the membership function of assigning the three primary colors is considered to be equal to 1, and the values of the membership functions of assigning the rest of the colors are calculated according to the proportions of the mix.

Fuzzification of Activity

We have a scale of personality-related activities:

$$<Act>= \{act_n\} \text{ and } n=1, \ldots, 5$$

As already mentioned, activities can range from static to very active or even chaotic. Obviously, with us this attribute is fuzzy. The terms of this linguistic variable are as follows: Act5 - very active (chaotic), Act4 - active, Act3 - neutral, Act2 - passive and Act1 - inert. The applicant will be presented with the pictures of the famous "hat test" in psychology and will be offered to choose the line of drawings that he likes. This determines the main activity with its membership function. He will then be presented with well-known "stone test" drawings in psychology, and will be asked to choose the line of drawings he likes. This determines the second activity with its membership function. The first selection corresponds to the existence of the main temperament (character type) and the second selection corresponds to the existence of the secondary temperament (character type) of the given applicant. This choice determines the main type of temperament (character type) and the type of secondary temperament (character type) with the degree of its membership function - the levels of reliability. Approximately the same is the case with the fourth attribute-favorite slogans. We are unable to give complete the process of fuzzification of this attribute due to lack of space.

Fuzzification of the Output Variable

Dellinger's work shows, the output variable is the sum of one major temperament (character type) and one secondary temperament (character type). The correspondence of the terms of the variable output in the algorithm with the types of temperament is as follows:

T1-sanguine
T2-phlegmatic

T3-choleric
T4-melancholic
T5-supine.

Since the variables in our case are fuzzy variables, the output variable will be a fuzzy set defined in the 5-temperament set aboveand μ_1 is the level of reliability of the primary temperament (character type), while R_1 is the value of the primary temperament (character type), and μ_2 is the level of reliability of the secondary temperament (character type), therefore R_2 is the value of the secondary temperament (character type), R_i=T1vT2vT3vT4vT5. The task of our algorithm is to determine the types and reliability values of primary and secondary temperament (character type) according to the membership values of the input fuzzy variables from the list of 5 temperaments listed above for a particular applicant. The algorithm will incorporate a pre-built knowledge base that expresses the connection of the individual attribute to the set of Delinger's five-element temperaments (character types). These separate classical (non-fuzzy) correspondences are known from the experiments of psychologists. After conducting the survey results in the knowledge database, we finally get the output fuzzy variables - the applicant's temperament in the following 2 fuzzy sets:

$$\mu_1^1 R_1^1 + \mu_1^2 R_1^2 + \mu_1^3 R_1^3 + \mu_1^4 R_1^4; \quad \mu_2^1 R_2^1 + \mu_2^2 R_2^2 + \mu_2^3 R_2^3 + \mu_2^4 R_2^4$$

Where all μ are numbers from 0 to 1 including 1, and R1 and R2 are one of the 5 temperaments defined from the beginning, R_i=T1vT2vT3vT4vT5. Then with fuzzy logic operations is obtained one primary and one secondary temperament type as follows: in the first set (in the set of primary temperaments) the corresponding Rs of the same temperament can be repeated, so we take the final value of the primary temperament as the R most commonly found. Its membership function will obviously be equal to one. In the second set (in the set of secondary temperaments) some Rs may have different values of the membership function. As a result, we get the fuzzy set defined on temperament types:

$$\mu_1 T_1 V \mu_2 T_2 V \mu_3 T_3 V \mu_4 T_4 V \mu_5 T_5$$

Where V denotes the "or" operation. In general the applicant temperament set is the fuzzy set, but if we want to get only the primary and secondary temperaments, then according to the principle of maximum we leave only two type of temperaments that will have the maximum membership functions. This temperaments will be a type of primary and secondary temperaments with its membership functions (reliability levels). Similarly, we can calculate the levels of reliability of other temperaments if we need it. A test program has been created that determines the primary and secondary temperament of a particular applicant in seconds after asking about ten questions. The created program communicates with the applicant in a dialog mode through dialog boxes. After fixing all four choices of the applicant, the button - "View results" is activated.

After clicking on the "View results" button, the final window of the program displays the type of primary temperament (character type) expressed in terms of its reliability (meaning of membership function), and the type of secondary temperament in the lower row with its level of reliability (meaning of membership function) and short verbal description of temperaments.

Conclusion

Human behavior is a complex, emerging phenomenon. Therefore, its description by mathematical equations is difficult. Psychologists have long concluded that the mechanism of temperamental decision-making has a strong influence on the systemic performance of both a particular person and a group of people. Because traditional tests are long, the irritant and the applicant can manipulate the answers, creating alternative approaches to determining a person’s temperament and perceptual regimen.

This paper combines several such alternative types of tests and uses modern fuzzy information technologies to present and process subjective information. It should be noted that the program algorithm is original. The program was also tested on different people, which showed that unlike the existing TemPerMod approach, the software system is equally successful in recognizing the temperament and character type of applicants with all five types of temperament. It is also free from other drawbacks of the existing TemPerMod approach. This type of software system can be of great use in the individualization of e-learning, which ultimately allows learning time to be reduced and efficiency to be significantly increased. It can have many other uses as well.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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How Graphs can Improve Targeting of Employee Trainings?

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Abstract: Skills matrices, also known as competency matrices, can help shift managers in a manufacturing environment in proper allocation of operators to workplaces. However, improving the skills portfolio of shift workers is often based on perceived problems with skills of absent workers. This study examines a company's skills matrices of the 3 shifts, questioning if graph metrics can help estimating substitutability, i.e., robustness of skills portfolio of workers to absenteeism; and how can graph mapping help better targeting trainings. The author has constructed bipartite graphs where one set of nodes are from the set of competencies and the other set of nodes are from the set of workers; and evaluated metrics comparing the skills portfolio of each shift. One projection of the bipartite graph shows the interlinks between people: when two workers are connected, they share the same skill and can substitute each other. The overall level of substitutability of people is then measured with the average degree of nodes of the projection graph. Weak connectedness, that is, low k values can highlight risks and exposedness to fallout of the respective workers. Disjoint graphs indicate if there is an option for a sub-team setup based on competencies. The other projection has an edge between to skills if and only if there is minimum one worker who is capable for both. Disjoint subgraphs of skills are helping team formation based on competencies.

Keywords: Skills matrix, Bipartite graph, Robustness, Substitutability, Team formation

Introduction

In mass production manufacturing environment, one of limiting factors is human resource, which's behaviour and capabilities change extremely rapidly, and external factors are unforeseenly altering its availability. If a worker falls out, the responsible leader, often the shift leader must immediately reallocate existing workers to maintain running of the facility. Reallocation decisions are supported not only by their experience, but useful tools such as competency matrices help to find sufficient replacement for the missing workers. Competency matrices help make sure that the substitutor is skilled and capable to perform the job. At the same time, shift leaders have juggle with capacities used for the moment and capacities of the future, thus ordering trainings to improve skill portfolio of workers. Those trainings are mostly done on the job (Patchong, 2016), and in working hours, the availability of the trainer is one of the driving forces. As a result, competency matrices are updated, skills are accumulated, but flexibility and exposedness to absenteeism is not examined in detail.

This study is questioning if the skills portfolio can be a good measure of substitutability, and contrary, the need for improving flexibility in immediate substitution of missing workers can determining training needs. A metric that estimates substitutability is developed on examining competences of high value adding indirect workers, where skills are not so rigidly standardized as in manufacturing. One of such metrics is the degree centrality of the human network (Szilágyi, 2019), with respect to the possessed competencies. Taking an industrial case study, the applicability of degree centrality as the measure of substitutability is evaluated, in case of competency matrices used in manufacturing environment.

The meanings of terms 'skill' and 'competency' are often differentiated, the former meaning the ability to apply knowledge, and the latter is possessing the knowledge and even some skills that leads to the ability to perform

successfully (Torres, 2022). There are various definitions, in industrial practice they are quite often used as synonyms. The term competency matrix refers to a spreadsheet where names and needed skills are listed, and trainedness is indicated in the cells as illustrated in Figure 1. In this study, the two terms will not be differentiated, and the skills portfolio of workers will be denoted with the term competency matrix, as widely used in industry.

Method

A typical competency matrix can be interpreted as the adjacency matrix of a graph, where nodes are the row or column headings of the matrix. A non-empty cell in the matrix indicates a node: the employee in the row of the matrix is trained in the skill of the column, and in the graph, the node of the employee is connected to the node of the skill. Though skills matrices may have indication of the level of expertise, in this study we simplified it to two levels: if a cell of a matrix contains the value 1, that employee bears that skill; and if a cell is left empty then this employee is inexperienced in that selected skill (Figure 1.). Thus, edges in the graph will uniformly be weighted. The direction of nodes will have no meaning, so we set up an undirected graph. The elements of the adjacency matrix are then defined by equation (1):

$$a_{ij} = \begin{cases} 1 & \text{if employee } i \text{ is trained in skill } j \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

	Skill1	Skill2	Skill3	Skill4	Skill5	Skill6
Name1		1				
Name2	1					
Name3	1	1	1			
Name4			1			
Name5					1	1
Name6			1		1	1
Name7	1		1	1	1	
Name8			1	1		
Name9			1	1		1
Name10	1					
Name11	1			1	1	
Name12					1	1
Name13			1	1	1	
Name14						1
Name15	1		1			1

Figure 1. Illustration of a simplified skill matrix (own illustration)

The nodes form two disjoint sets: a set of nodes representing employees, and another set of nodes representing skills. Edges denote if a person is trained in the respective skill, thus every edge goes from a name to a skill (Figure 2.). Such a graph is called bipartite graph (Pokorádi, 2008). The diameter of dots representing the nodes on Figure 2 is proportional to the degree, i.e., the number of edges arriving at the respective node.

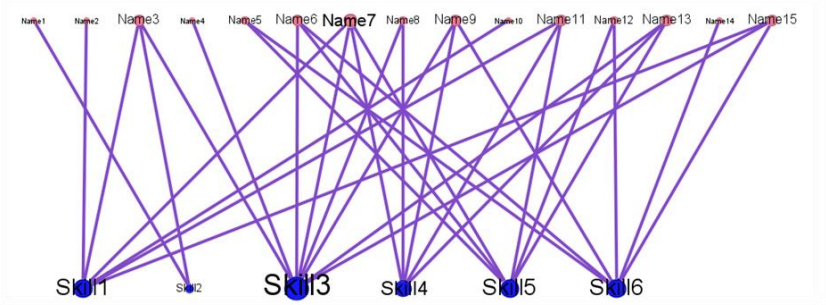

Figure 2. A names-skills bipartite graph generated from Figure 1. (own illustration)

In case a person is missing, e.g., on a sick leave or any other unplanned event, the shift leader can only choose another person to substitute the missing one, who shares the same skill. On the competency graph (Figure 2.), substitutability means two people can substitute each other in a job requiring a given skill if there is a path from Name(i) to Name(j), through Skill (n), as shown in equation (2). In this path, the hopcount equals exactly 2.

$$P_{Name(i)\to Name(j)}(2) = \text{Name}(i) \to \text{Skill}(s) \to \text{Name}(j) \quad (2)$$

Mapping substitutability means finding the two persons share the same skill, that is, listing each path between names where the hopcount equals 2 exactly. A projection (Barabási, 2016) of the names-skills bipartite graph (Figure 2.) to the nodes of names would result in a graph where between two names there is only an edge when they share a skill. If they share several skills, the edge weight equals the number of skills they both possess. Let ${}_N a_{ij}$ denote the elements of the adjacency matrix of the Names projection of the names-skills bipartite graph, and its values are then given by equation (3).

$${}_N a_{ij} = \begin{cases} c_{ij} & \text{where } c_{ij} \text{ is the count of skills } Name(i) \text{ and } Name(j) \text{ have in common} \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

A very similar projection of the names-skills bipartite graph is available for the skills. If two skills are connected with an edge on that projection, it means there are people who share those skills and can substitute each other in the other skill. If we assume that one skill is needed to perform a given job and another skill is needed to perform another job, this projection identifies the possibility to reallocate people from one job to another in case there is insufficient number of workers in a job, and load and priorities makes reallocation possible. Gephi Graph Visualization and Manipulation Software ver.0.10.1. has been used to plot and analyze graphs, and projections were filtered with the MultiMode Networks Transformation Plugin. The bipartite graph of Figure 2 is then simplified to the following projections (Figure 3. and 4.):

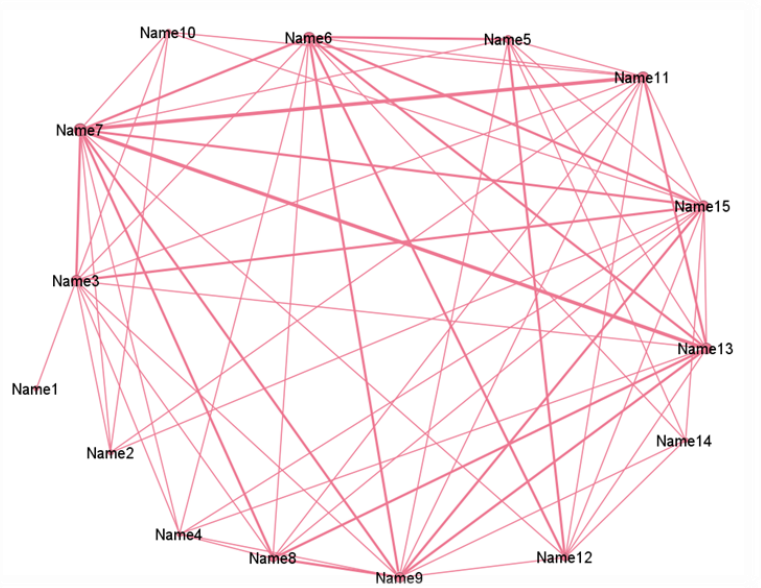

Figure 3. The names projection from graph of Figure 2. (own illustration)

If a person has only one connection, that means he has only one other person with whom they can substitute each other in case either one is missing from the job, like ‘Name 1’ and ‘Name 3’ on Figure 3. The number of connections, i.e., the degree of a given node sets a pool of people who can substitute in case a person is missing. If ‘Name 1’ falls out, ‘Name 3’ is there to substitute him or her on the skill they have in common; and as the weight of this connection is 1, they share only one skill. On the other hand, if ‘Name 3’ falls out, his or her connections define the pool of various other people who can substitute him or her, but we have to keep in mind that ‘Name 3’ had 3 skills and is capable to work in various positions. On a given day, the shiftleader will need to substitute ‘Name 3’ only in a particular job requiring a specific skill, thus, limiting the pool to those people who share the required skill with ‘Name 3’.

In this study, we work with the simplification that one given job requires a given skill, and do not examine the strategic importance and load of jobs. To keep the privacy of the data provider, skills are indicated by numbers such as ‘Skill1’ to ‘Skill70’, and so are people identified with ‘Name1’, et cetera. Functional areas and groups of technology are numbered, and shifts are marked with capital letters in the analysis.

The greater number of skills two people share, i.e., the larger the weight of an edge connecting them, the more jobs they can substitute each other. The most optimistic, yet unrealistic approach is to arrive at a complete graph on both projections, with uniform weight distribution, i.e., every single person can substitute anybody else in

any selected job. A complete graph has a density equals 1, that means each node is connected to each of its possible neighbors (Barabási, 2016).

Weights of edges on the skills projection indicate how many people share the two skills, that is, the number of people who are skilled to do both of the jobs. If a skill is disconnected, the people bearing that skill can not be redeployed in other jobs requiring other skills, thus reducing flexibility on allocation. Missing or weak links between skills may indicate the need of cross-functional training of workers, and so improving reallocation possibilities.

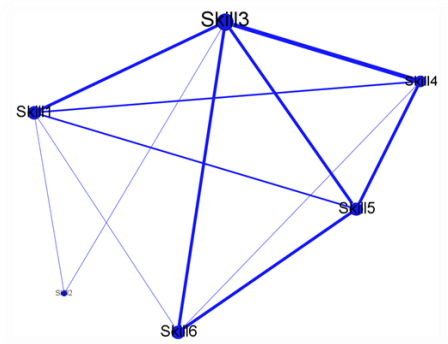

Figure 4. The skills projection from graph of Figure 2. (own illustration)

Data Source

An electronics manufacturer company's plant located in Central Hungary region provided competency matrices of the direct production areas. At the time of study, 447 workers allocated in 3 shift work pattern were analyzed, and 70 skills identified so that a skill is required to perform a job. During cleaning of the data, we found new recruits who are not yet trained sufficiently in any of the skills, and not capable to work alone in any of the jobs. These newcomers with zero skills are excluded from the further analyses, as they have zero links in the names-skills bipartite graph, cannot substitute any other operator, and cannot be substituted by anyone else.

Substitutability of fallen-out workers is a short-term problem for shiftleaders, as they must redeploy people in the beginning of the shift in order to enable running most of the workstations according to the production schedule. At that very point of time, they cannot rely on workers of other shifts as they are away from the plant and are unreachable for the duration of their compulsory rest periods. Immediate substitutability is just served by the people who are in at the given shift, with the skills portfolio they have been trained in the past. Thus, shifts A, B, and C are separately analyzed and compared. Headcounts of shifts allocated to the functional areas is summarized below (Table 1.):

Table 1. Headcount distribution pivoted from the competency matrices.

Shift → Functional area	A	B	C
1	14	15	14
2	16	20	16
3	17	14	15
4	25	28	18
5	13	16	13
6	28	27	24
7	39	40	35
Total	152	160	135

The manufacturing area has a functional layout, that means, similar technologies are located nearby, so are similar job positions geographically near each other on the shopfloor. Supervisors of the seven functional areas are supported with trainers who work as power users, train newcomers, and cross-train existing workers to new skills in their standard working hours. Functional areas are within the same building just a few steps away from each other, however, cross cooperation of trainers is hardly observed.

Results and Discussion

Descriptive Analysis

In the competency matrices, there are altogether 2416 records of trainedness for the 447 people, averaging out to 5.4 skills per person, that means, an average worker is able to perform 5 different jobs. The distribution of skills count per person surprisingly shows (Figure 5), there are workers possessing more than 20% of all the skills needed in the factory. Their overtrainedness is hardly justified by business needs, in addition, it is unlikely that one person can perform 16 different jobs at the same quality. There is a visible difference between shifts with regards to the distribution of skill count per person, suggesting that the three shiftleaders and their trainers by functional areas might run their own procedures on selecting whom to train and to what to train. In shift B, the 17 people having 0 skills are seemingly newcomers already included in the matrix but not yet able to work alone in any of the jobs.

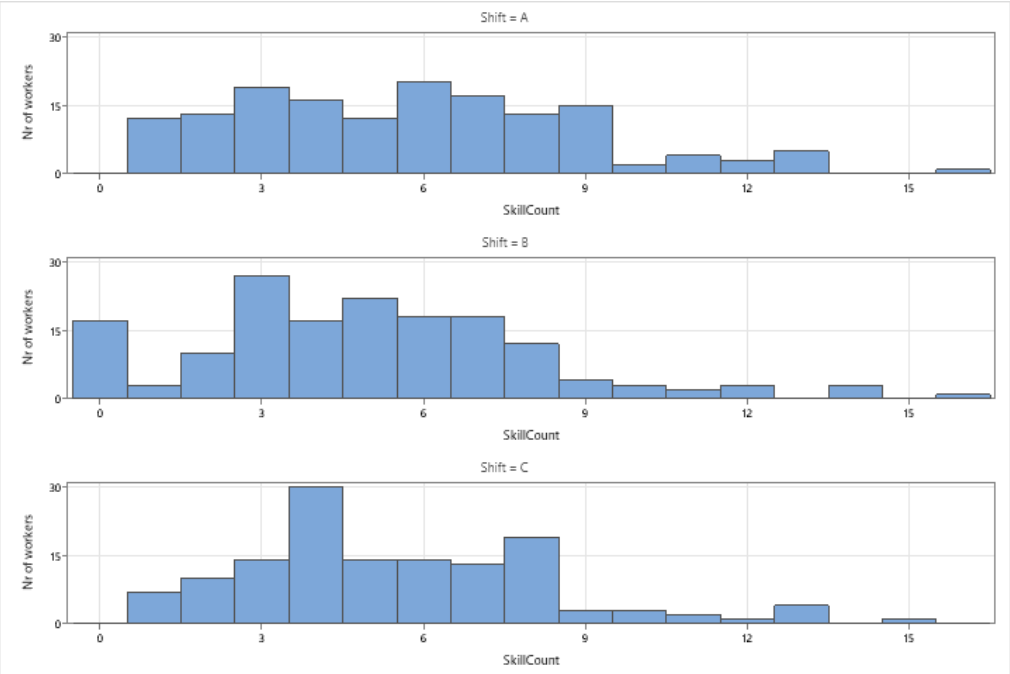

Figure 5. The number of skills workers possess, by shift. (own diagram)

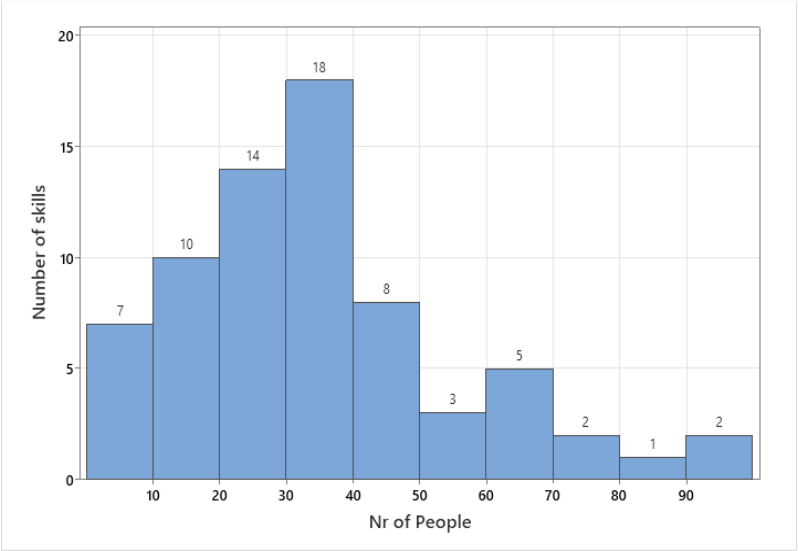

Figure 6. The number of skills by the number of people possessing them. (own diagram)

The penetration of trainings can also be measured from the skills point of view (Figure 6.) There are only 7 skills at which less than 10 people are trained plant-wide, that is 10% of all the skills. Speaking substitutability

point of view, these are the skills with highest training priority, unless these were associated with jobs ramping down. On the other end of the scale, there are 3 skills which are possessed by more than 20% of the workers. Overrepresentation may be justified if those skills were basic skills of strategic importance, or they were associated with jobs performed by large number of people in a parallel arrangement, due to reasons of capacity adjustment.

Outcomes of Bipartite Graphs

Bipartite graphs of names and skills have been constructed for each shifts' competency matrices, and colors were assigned to identify functional areas, meaning the same functional areas throughout all the graphs, as follows: red – 1; violet – 2; blue – 3; light blue – 4; green – 5; melon – 6; brown – 7. Projections of the graphs (Figure 7.) were created by MultiMode Networks Transformation Plugin of Gephi, and visualization was rendered with Fruchterman Reingold algorithm (Fruchterman & Reingold, 1991) of Gephi (Heymann, 2015).

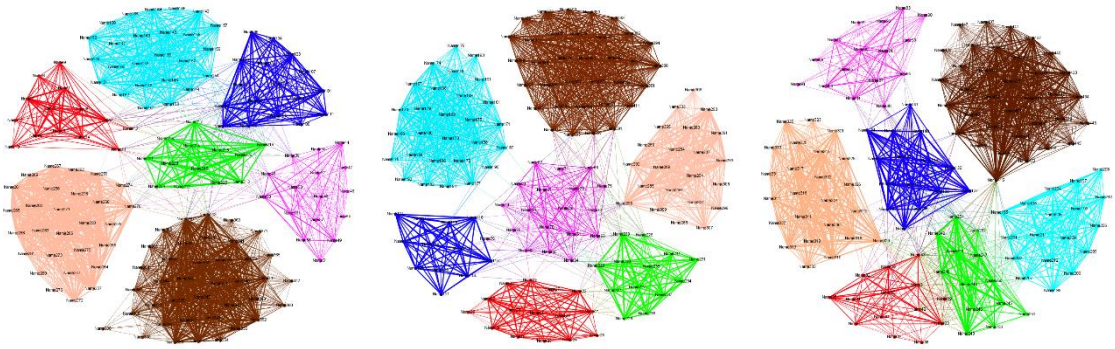

Figure 7. Projection to people of shifts A, B and C respectively (own graph)

Projections to people indicate that within functional areas there are strong connections of people, i.e., they share the same skills, but, apart from a few bridges, they can not be redeployed in any other area. Quantitative description of projections and their subgraphs filtered to functional areas is summarized in Table 2. Although average degrees are high above 20 suggesting good choice of substitutability for replacing a missing person, they do not seem to ensure flexibility of reallocation, because nodes only have high degrees with nodes within the same functional area. If we filter to edges which connect nodes between functional areas, the average degree drops dramatically to 1.5-3.5. The quantitative analysis supports the visual impression of Figure 7, that the factory has nearly full flexibility of substitution within any functional areas; but there are hardly any people who could relocate to another cell in case they are needed elsewhere.

Table 2. Quantitative description of projections and subgraphs.

Functional area	Density			Average degree		
	A	B	C	A	B	C
1	0.967	0.962	0.934	12.571	13.467	12.143
2	1	0.906	0.917	15	16.316	13.750
3	1	1	1	16	11	14
4	1	0.995	1	24	26.857	17
5	1	1	1	12	12	12
6	0.992	1	1	26.786	21	23
7	0.911	1	0.992	34.615	33	33.714
Total graph	0.167	0.165	0.181	25.250	23.427	24.222
Between functional areas	0.013	0.011	0.026	1.934	1.497	3.526

It is not a surprise that skills are more tied to the functional areas, however, a very similar phenomena are visible on the projections to skills (Figure 8.), mostly skills within the same functional area share a substantial number of people, whereas there are very few connections between functional areas. There are disconnected nodes on the skills projection in every shift: only 1 in shifts 'A' and 'B', and 7 in shift 'C' – suggesting that shift 'C' organizes and documents shopfloor trainings on a different manner. People who work in jobs where disconnected skills are required have no substitute people in case they fall out of work, that brings a huge risk to business continuity.

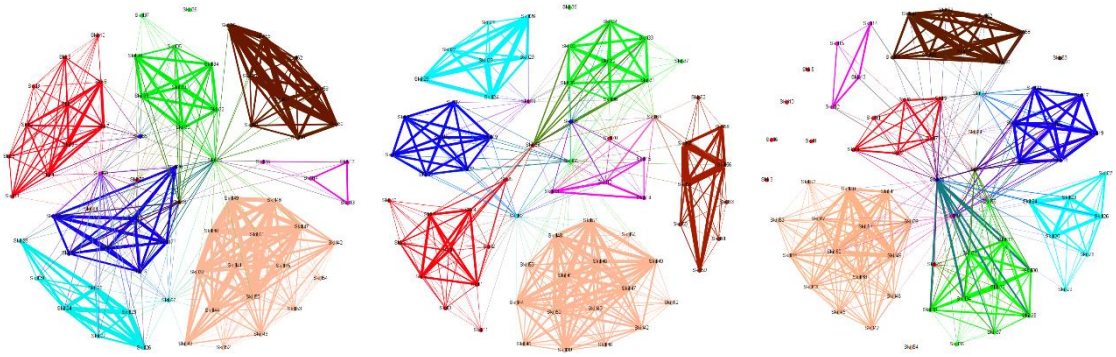

Figure 8. Projection to skills of shifts A, B and C respectively (own graph)

Our expected outcome was to find interrelated skills on that projection, which enable us to form clusters of skills for trainings. Figure 8. suggests the existence of such clusters, however, in the case of the examined company, these clusters existed before the analysis. The functional arrangement of layout and the trainers assigned to area supervisors directs trainers to focus only on their own area's required skills. In this company, the local focus went so far that it practically disables redeploying people in another areas as they are trained to be specialists of their own area.

Conclusion

A bipartite graph can be constructed taking a competency matrix as its adjacency matrix, and having one set of nodes as the workers, and the other set of nodes as skills or competencies. There is an edge between a person and a skill if and only if the person possesses that skill. Projections of that bipartite graph to people has an edge between two persons if and only if they share a skill, that is, in case any of them falls out, the other person can substitute him or her on that skill. The degree of a node indicates how many people are potentially capable to substitute that person represented by a node, on the skill they both share.

This study was aiming to use the degree centrality to measure the level of substitutability. By finding the nodes with the lowest degree, i.e., the least replaceable people, and implementing training programs to cross-learn each other's skills would improve the degree distribution. The analyzed data set however showed it, that degree centrality by itself is not sufficient to measure substitutability, as the projection graph had clearly visible clusters aligned with functional groups. The average degree within clusters was a magnitude higher than the degree between clusters, thus showing that substitution is possible within a cluster, but the flexibility of reallocation is limited across functional areas. A possible explanation of such an imbalance could result from the functional arrangement: if a newcomer is first introduced to an area and learns its skills, becomes familiar with machines and people working in that micro-environment, later neither the worker wants to move on, nor the area supervisors are willing to lose a trained person, eventually, the employee is trapped in that area.

The density of the projection graph may be another indicator of substitutability. If the density is close to 1, practically any employee may replace anybody else, as they all pairwise share a skill or more. Density equals or is close to 1 in subgraphs filtered to functional areas. The practical guide to the shiftleader in that case would read like: if there is a lacking person, try to find replacement within the same functional area.

Recommendations

If there is a business need to improve allocation flexibility – as it was at the data source company, the competency portfolio shall be developed with cross-functional trainings, that is, trainings shall not stay within one area. In terms of density of the names projection of the names-skills competency graph, that mean more homogeneous density distribution.

Substitutability in manufacturing environment where necessary skills are standardized is a field yet to study. With It is an open research question if there is a limiting density, above which business continuity is not in risk.

The author recommends to further analyze the robustness of the human network of manufacturing based on skills portfolio and find if there is correlation between the absenteeism rate and the limiting density.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

Acknowledgements or Notes

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Qasidas of ‘Amr b. Sâlim al-Khuzâ ‘î and Ḥassan b. Thâbit on the Eve of the Conquest of Mecca

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Abstract: Arabs have expressed their joys, sorrows, praises and satires more effectively with poetry throughout history. Thus, the poets of the tribes were seen as the most respected people after the chief of the tribe. ‘Amr b. Sâlim al-Khuzâ‘î is one of the poets of the Khuzâ‘a tribe. In the Hudaybiya peace treaty between Muslims and Qurayshi infidels, the Khuzâ'a tribe took place as an ally of the Muslims, while the Banu Bakr tribe took place as an ally of the Qurayshi infidels. Some people from the Banu Bakr tribe, with the help of the notables of the Qurayshi tribe, violating the peace treaty killed 23 people in their raid on the Khuzâ‘a tribe. ‘Amr b. Sâlim al-Khuzâ'î, having come to Medina with 40 people from his tribe, recited his 8 couplet qasida in the presence of the Prophet to complain about the pain they experienced and to respond to the attack. On this event, the Prophet started an expedition against the Qurayshis who broke the agreement, which would result in the conquest of Mecca. During this preparations of the expedition, one of the prophet’s poets, Ḥassan b. Thabit also wrote an 6 couplet qasida in which he denounced the attack on the Khuza‘a tribe and encouraged the Muslims to prepare for the expedition. These poems which arouse deep emotions, to convey messages of encouragement and threat, to buid a collective consciousnes and to act as a trigger to change the course of history highlight the impact and its indispensable role of poetry as an instrument of communication and war during the era of Sadr al-Islam. In this study these two qasidas which which has an important place in the history of Islam, are analyzed.

Keywords: Qasida, ‘Amr b. Sâlim al-Khuzâ ‘î, Khuzâ ‘a, Ḥassan b. Thâbit, Conquest of Mecca.

Introduction

Arabic poetry emerged at the end of the 5th century A.D. It gained its tecnical and artistic character with qasidas introduced by Imru’ al-Qays who was the most outstanding poet in clasiccal Arabic poetry. Qasidas then served as a model for later Arabian poets. But after the rising of Islam due to the radical political and social changes in society, this type of poetry was disfavored. In the meantime satires and mutual taunting occasional poems composed by poets of rival parties were in high demand (Gibb, 1986; al-Kafrâvî, 1958).

The reason for this initially based on the verse 224 of Surah ash-Shu'âra ﴿وَالشُّعَرَاءُ يَتَّبِعُهُمُ الْغَاوُۥنَ﴾ *[And the poets, (only) the deviators follow them]* it was understood by Muslims that poetry was prohibited. But then it was clarified by Prophet Muhammad that the verse was refering the poets who compose poems satirizing Muslims and containing tribal animosity and immorality were adhering to the customs of the pre-Islamic era (Durmus, 2010).

With the prohibition of poems that praised the customs of the pre-Islamic era, the number of narrators of such poems decreased. Some poets, like Labîd b. Rabî‘a, who were among the mu'allaqah poets, ceased composing poetry after embracing Islam. During this period, due to the restrictions imposed by Islam and the fact that these poets, unlike the pre-Islamic poets, lived in urban environments, there was a decline in artistic quality in poetry. However, during this period, there were Muslim poets who wrote aesthetically beautiful poems, such as Ka'b b.

- Selection and peer-review under responsibility of the Organizing Committee of the Conference

Zuhayr, al-Ḥuṭay'a, Abu Dhu'ayb al-Hudhalî, ash-Shammakh b. Ḍirâr, al-Mukhabbal as-Sa'dî, an-Namir b. Tawlab, Suwayd b. Abî Kâhil, and al-Kumayt b. Ma'rûf (Demirayak, 2017).

When Ka'b b. Mâlik implied that they would no longer be able to recite poetry by referring to this verse Prophet replied him by saying {إِنَّ الْمُؤْمِنَ يُجَاهِدُ بِسَيْفِهِ وَلِسَانِهِ} [A true believer fights with his sword and tongue]. The Prophet encouraged the poets Ḥassan b. Thabit, Ka'b b. Malik, and Abdullah b. Rawaha who are also known as the Prophet's poets to challenge the enemies with their poems. And he praised their poetic skills by stating that they were raining arrows upon the enemies with their poetry (ash-Shaybânî, 1998; al-Iṣfahânî, 2008).

During the era of the Sadr al-Islam the three main poets of Quraysh who satirized Prophet were Abdullah b. az-Ziba'rî, Abû Sufyân b. al-Ḥârith and 'Amr b. al-'Âṣî. Ḥassan b. Thabit, Ka'b b. Mâlik and Abdullah b. Rawâḥa as for the poets of the Prophet, praised theirselves in their poetry for their battles and heroism, and satirized their infidelity in a manner similar to the Qurayshi poets words. The poetry of Ḥassan b. Thabit and Ka'b b. Mâlik had a strong impact on the Quraysh people (al-Iṣfahânî, 2008).

Ḥassan b. Thabit, a member of the Hazraj tribe and one of the poets of the Prophet, was defending his tribe with poetry in battles between the Aws and Hazraj tribe before embracing Islam. He was chosen by Prophet Muhammad to defend the Muslims with his poems against the poets who attacked Muslims through their poetry and a pulpit was set up for him in the mosque by the Prophet. The Prophet told him that Gabriel supported him in his poems. The Prophet also stated that Ka'b b. Mâlik and Abdullah b. Rawâḥa demonstrated great proficiency when ordered to compose poetry, and when Ḥassan b. Thabit was ordered to compose poetry it brought healing and he found healing through it. Ḥassan b. Thabit had a great impact with his poetry. His poem calling Muslims to war when Khuzay'ah tribe were attacked by the Banu Bakr before the conquest of Mecca, which is examined in this study, had a greater impact on the Quraysh than arrow wounds (al-Iṣfahânî, 2008; Hazer, 2008). During the era of Sadr al-Islam, it can be observed that poetry held a significant place in Arab society as an influential political and war instrument.

Beside this Arabs used poetry in pre Islamic and and early Islamic era not only for expressing emotions but also for communicative purposes. It is seen that poets used to benefit from poetry to defend their tribes, religous leaders and their companins and defy their enemies before and after historical events. Thus poetry can be accepted as a historical source (Borg, 2015). These poems were mostly composed spontaneously by poets who act as a tribe spokesman or demagogues not from the point of aestethic views (Grunebaum, 1940).

Khuzay'ah tribe had formed an alliance with the Muslims in the Ḥudaybiyah agreement, which took place in 6 AH (628 CE) between the Muslims and the Quraysh. On the other hand the Banu Bakr tribe were in an alliance with the Quraysh. The representative of the Khuzay'ah tribe 'Amr b. Salim al-Khuzai expressed his grievance by reciting a poem to Prophet Muhammad when he came from Mecca to Medina with a group of 40 people about the attack by the Banu Bakr tribe which resulted in the death of 23 individuals (Köksal, 2008). It can be concluded that in the era of Sadr al-Islam the poetry was also used by the poets as a communication and a diplomacy instrument.

The Situation Prior to the Conquest of Mecca and the Attack of the Banu Bakr on the Banu Khuzâ'a

After Prophet Muhammad's migration to Medina, a struggle ensued between the Muslims and the Quraysh of Mecca. Despite their attempts in the battles of Badr, Uhud and the Khandaq, the Quraysh were unable to gain superiority over the Muslims and they lost the hope of eliminating the Muslims. As the Muslims exerted pressure on the trade routes and more tribes embraced Islam, the Quraysh formed alliances with other tribes. On the other hand, the Muslims were not yet capable of conquering Mecca (Bozkurt & Küşükaşçı, 2003).

In the year of 6 AH (628 CE) Prophet Muhammad, accompanied by his companions, embarked on a journey to Makkah to perform Umrah (pilgrimage). They wore the Ihram garments and arrived at Ḥudaybiyah, a place near Makkah, where they set up their camp. The Quraysh's refusal to allow Prophet Muhammad to enter Makkah led to a decision to negotiate and reach an agreement between the two parties. This agreement, known as the Treaty of Ḥudaybiyah, established a 10-year peace treaty between the Muslims and the Quraysh (Hamidullah, 1998).

The agreement involved the inclusion of other tribes who sought to form alliances with one of the two sides. While the Banu Bakr tribe demanded for an ally with the Quraysh, Banu Khuzâ'a desired to make an alliance with the Muslims (Ibn Hishâm, 1955).

After the Ḥudaybiyah Treaty was concluded, while Prophet Muhammad was returning from Mecca to Medina, the Surah al-Fath (Victory) was revealed. The first verse of this Surah states:﴿إِنَّا فَتَحْنَا لَكَ فَتْحًا مُّبِينًا﴾ [Indeed, we have granted you a manifest conquest]. Furthermore, in the 18th and 27th verses of the Surah, the expression فَتْحًا قَرِيبًا [an imminent conquest] is mentioned, indicating that the Muslims will be granted victory soon. This Surah gave glad tidings to the Muslims of the imminent conquest of Mecca (Isık, 1995).

There had been a blood feud between the Banu Khuzâ‘a and the Banu Bakr since ancient times. Despite the Ḥudaybiyah Treaty, Nawfal b. Mu‘âwiya al-Dîlî, the leader of the Banu Dîlî which is a branch from the Banu Bakr, was waiting for an opportunity to seek revenge with the help of the Quraysh (Koksal, 2008).

Anas b. Zunaym al-Dîlî, a member of the Banu Dîlî, made a satirical remark about Prophet Muhammad in one of his poems, and as a result, a young man from the Banu Khuzâ‘a wounded him on the head. In retaliation for this incident, the Banu Bakr sought assistance from some members of Quraysh. Then they launched an attack on the location where the Banu Khuzâ‘a was staying, near the Watir water source and killed some of them. Those who survived from the Banu Khuzâ‘a sought refuge in the house of Budayl b. Warqâ in Mecca, but despite this, 20 men from the Banu Khuzâ‘a were killed in front of that house (al-Vâḳidî, 1965).

Following this incident, Quraysh individuals Ḥârith b. Hishâm and B. Abî Rabî‘a condemned the prominent Quraysh figures such as Ṣafwân b. Umayya, Suhayl b. ‘Amr and ‘Ikrima b. Abî Jahl who were among the Quraysh attackers for violating the Ḥudaybiyah Treaty with their actions. They called for the intervention of Abu Sufyan to renew the peace treaty (al-Vâḳidî, 1965).

Meanwhile, Prophet Muhammad wrote a letter to the Quraysh, urging them to either abandon their alliance with the Banu Bakr and pay compensation to the Banu Khuzâ‘a, or be prepared for war. However, Quradha b. Abdi ‘Amr b. Nawfal, one of the Quraysh individual, responded that they would not pay compensation, would not end their alliance with the Banu Bakr, and were ready to engage in battle (al-‘Asḳalânî, 1998). After this development, Abû Sufyân went to Madina in an attempt to renew the peace treaty. However, Prophet Muhammad refused to renew the peace treaty and did not respond to him. Abû Sufyân also sought the intervention of the Muslim leaders in Madina, but he did not achieve any result and had to return to Mecca without success (aṭ-Ṭabarî, 1969). After this incident, Prophet Muhammad called upon the Muslims in Madina and other regions who had accepted Islam to gather in Madina during the month of Ramadhan, without revealing the direction of the expedition. In the month of Ramadhan in the 8 AH (630 CE), Prophet Muhammad set out towards Mecca with approximately 10,000 fighter. Due to the lack of strength and ability of the Quraysh to resist the Muslims, Mecca was conquered without significant conflict or battle (Ibn Sa‘d, 1968; Bozkurt & Kusukascı, 2003).

Qaṣida of 'Amr b. Sâlim al-Khuzâ‘î

After the assault resulting in the death of 23 individuals which was carried out against the Khuzay'ah tribe by the Banu Bakr tribe with the assistance of Quraysh, 'Amr b. Salim al- Khuzâ‘î arrived at Madina with a group of 40 people and sang his poem in front of the Prophet Muhammad to demand for taking revenge (al-Mostarî, 1324; al-Vâḳidî, 1965; Ibn Hishâm, 1955).

يَا رَبِّ إِنِّي نَاشِدٌ مُحَمَّدًا ... حِلْفَ أَبِينَا وَأَبِيهِ الْأَتْلَدَا
قَدْ كُنْتُمْ وُلْدًا وَكُنَّا وَالِدَا ... ثُمَّتَ أَسْلَمْنَا فَلَمْ نَنْزِعْ يَدَا
فَانْصُرْ هَدَاكَ اللَّهُ نَصْرًا أَعْتَدَا ... وَادْعُ عِبَادَ اللَّهِ يَأْتُوا مَدَدَا
فِيهِمْ رَسُولُ اللَّهِ قَدْ تَجَرَّدَا ... إِنْ سِيمَ خَسْفًا وَجْهُهُ تَرَبَّدَا
فِي فَيْلَقٍ كَالْبَحْرِ يَجْرِي مُزْبِدًا ... إِنَّ قُرَيْشًا أَخْلَفُوكَ الْمَوْعِدَا
وَنَقَضُوا مِيثَاقَكَ الْمُؤَكَّدَا ... وَجَعَلُوا لِي فِي كَدَاءٍ رُصَّدَا
وَزَعَمُوا أَنْ لَسْتُ أَدْعُو أَحَدَا ... وَهُمْ أَذَلُّ وَأَقَلُّ عَدَدَا
هُمْ بَيَّتُونَا بِالْوَتِيرِ هُجَّدًا ... وَقَتَلُونَا رُكَّعًا وَسُجَّدَا

Oh my Lord, I beseech Prophet Muhammad for assistance for the sake of the ancient alliance between our ancestors and his forefathers

The poet, in this couplet, seeks help from the Prophet by referring to the alliance between Banu Khuzā‘a and the grandfather of the Prophet Muhammad, Abdul-Muttalib b. Hâshim. When Abdul-Muttalib's uncle Muttalib b. Abdi Manaf passed away, his other uncle Nawfal b. Abdi Manaf seized Abdul-Muttalib's properties. Unable to seek assistance from the Quraysh, Abdul-Muttalib sought help from his maternal uncle, Abu As'ad al-Najjârî in Medina, and with his support he reclaimed his properties. Following this event, Banu Khuzā‘a desired to form an alliance with Abdul-Muttalib. With Abdul-Muttalib's acceptance, they wrote a document and hung it on the wall of the Kaaba (Koksal, 2008).

You were then the ones being born, while we were the ones giving birth, afterwards, we became Muslims and did not withdraw our hands

The poet, with reference to the fact that the mother of Abdi Manaf, the great-grandfather of the Prophet, belonged to the Khuzā‘a tribe, expresses their position as the bearers of lineage and Banu Abdi Manaf’s position as borns. Quṣay b. Kilab, the father of Abdi Manaf, married Hubba, the daughter of Hulayl b. Hubshiyya, who was the leader of the Banu Khuzā‘a and held influence over Mecca at that time. Additionally, Kusay b. Kilab's mother, Fāṭimā bint Sa‘d, also belonged to the Khuzā‘a tribe (Ates, 2002; al-Mostarî, 1324).

Just as Allah has guided you, extend a mighty support to us and call upon Allah's worshipers to come to our aid
The poet expressed a desire for a retaliation against Banu Bakr and the Quraysh with a war in which all Muslims would participate, following the attack they suffered and the alliance they formed with Prophet Muhammad in the Hudaybiyyah Treaty. When the poem ended, Prophet Muhammad stood up, gathered his robe, and declared that if he didn't help Banu Ka'b (Banu Khuzā‘a) with the things that had helped him, then he should not receive help either. He proclaimed, "I am with the Khuzā‘a, and I am from the Khuzā‘a." Then he said that 'Amr b. Salim had been helped. With this reply the prophet promised him to take revenge of this attack. At that moment, a cloud appeared to the Prophet, and the Prophet said that it was a sign that assistance would be granted to Banu Ka'b (al-Vâḳidî, 1965; Ibn Hishâm, 1955; an-Namarî, 1996).

At the head of which the Messenger of Allah was present, in a state that his face darkened with anger when meanness is don.

When the wife of the Prophet, Hz. Aisha saw the Prophet after he listened to this poem, she stated later that she had never encountered such anger in him before. And at that moment, the Prophet instructed her to convey to Hz. Abu Bakr and Hz. Umar that they should prepare for war (al-‘Asḳalânî, 1998).

With an army like a bubbling sea, indeed the Quraysh did not keep their promise to you.

The poet wished for all Muslims to participate in retaliating against the attack they faced, with the Prophet leading them. As the poet desired, the Prophet called upon all Muslims to gather in Medina. A 10,000-strong army was assembled in Medina, consisting of both the Muhajirun (emigrants) and the Ansar (helpers). Among the tribal groups that joined the army were Banu Aslam, Ghifar, Muzayna, Juhayna, Ashja‘, and Sulaym (İbn Sa‘d, 1968).

They broke the solid treaty with you and spied on us in Kadâ’

The poet is referring to the Hudaybiyya Treaty, which was made between the Muslims and the Quraysh. The treaty stipulated that both parties would not attack the allied tribes for a period of ten years. However, Banu Bakr, along with some prominent individuals from the Quraysh, violated this peace agreement by launching a surprise attack on Banu Khuzâ‘a during the night. The poet's mention of "they spied on us" indicates the magnitude of the cruelty committed during the most vulnerable time of the night. Kadâ' is a mountain near Makkah, and the Watir region mentioned later in the poem is the area where the Banu Khuzā‘a lived. It is likely that the mention of Kadā' mountain which is close to Watir in the poem is for the sake of rhyme (İbn Hishâm, 1955; al-Bakrî, n.d.).

They thought that I would not call anyone for help, even though they were more dishonest and fewer in number.

Banu Khuzā‘a, living in the distant region of Makkah, where the Muslim population was relatively small, did not expect any attack as they felt secure under the terms of the Ḥudaybiyya Treaty. Otherwise, they would have been prepared for such an assault. When Banu Dîlî and Banu Nufatha sought assistance from certain Quraysh tribes to carry out the attack, they did not receive support from some tribes of Quraysh who wished to uphold the treaty. The Quraysh individuals who did provide them aid by supplying weapons and horses tried to conceal their support. However, the participation of the Quraysh attackers was noticed. Therefore, the poet derogatorily refers to them as lacking honor and being few in number (al-Vâḳidî, 1965).

They ambushed us while we were performing night prayers in Watir and killed us while we were in the state of bowing and prostration

Watir is a place in the region where Banu Khuzā‘a resided and has a water source. While not all members of Banu Khuzā‘a were Muslims, there were many Khuzā‘a individuals who served Islam from its early days. From the poet's words, it can be understood that among those killed in the attack, there were Muslims as well (al-Bakrî, n.d.; Önkal, 1998; Musa, 2013). Indeed, the poet emphasizes that besides the attack taking place at night, those who were performing the night prayer (tahajjud) were also killed. By highlighting this, the poet indicates that the raid on Banu Khuzā‘a was not only a blood feud but also an attack against the Muslims, as there were Muslims among them. This indicates the poet's intention to create a sense of outrage among all Muslims and urge them to seek revenge for this act. Poems were composed by both sides regarding the attack on Banu Khuzâ'ah. Al-Akhzar b. Lu'ṭ ad-Dîlî from the Banu Dîlî, a branch of Banu Bakr, recited a poem praising the cruelty committed. In response to this, Budayl b. Abdi Manât composed a poem. Regarding this incident, Ḥassan b. Thabit, the poet of the Prophet, wrote the following two verses. However, this poem is not included in Ḥassan b. Thabit's collection (divan) of poems: (as-Suhaylî, 1967; İbn Hishâm, 1955).

لَحَا اللهُ قَوماً لَم نَدَع مِن سَرَاتِهِم لَهُم أَحَداً يَنْدُوهُمُ غَيرَ ناقِبِ
أَخُصْيَيْ حِمارٍ ماتَ بِالأَمسِ نَوفَلاً مَتَى كُنْتَ مِفْلَاحاً عَدُوَّ الحَقائِبِ

May Allah curse a tribe whom we did not leave anyone among their prominent figures to call them except for one man.
Oh Nawfal, the two testicles of a donkey died yesterday and the enemy of the saddlebags, when have you ever become a righteous person

Ḥassan b. Thabit, in mentioning the absence of a prominent figure who could gather the members of the Banu Dîlî which is a branch from the Banu Bakr, except for Nawfal b. Mu'awiya al-Dîlî who attacked Banu Khuzā‘a, highlights the pitiful state of the Banu Dîlî. Ḥassan b. Thabit, like the poet of the Khuzā‘a, accuses Nawfal b. Mu'awiya al-Dîlî, the leader of the Banu Dîlî who carried out a treacherous ambush during the night, of being a dishonest man and a common thief who steals from saddlebags carried by the animals in the caravans.

Qaṣîda of Ḥassan b. Thabit

After the Prophet listened the poem of 'Amr b. Salim al- Khuzâ‘î and called upon the Muslims to embark on a campaign Ḥassan b. Thabit, composed his poem in which he accused the prominent figures of Quraysh of participating in the treacherous attack carried out by Banu Bakr against Banu Khuzā‘a and threatened them to be prepared for a fierce battle (al-Ansârî, 1994; al-Barḳûḳî, 1929; İbn Hishâm, 1955).

وَغِبْنَا فَلَمْ نَشْهَدْ[1] بِبَطْحَاءِ مَكَّةٍ رِجَالُ بَنِي كَعْبٍ تُحَزُّ رِقَابُهَا
بِأَيْدِي رِجَالٍ لَمْ يَسُلُّوا سُيُوفَهُمْ وَقَتْلَى كَثِيرٌ لَمْ تُجَنَّ ثِيَابُهَا
أَلَا لَيْتَ شِعْرِي هَلْ تَنَالَنَّ نُصْرَتِي سُهَيْلَ بْنُ عَمْرٍو وَخُزُهَا وَعِقَابُهَا
وَصَفْوَانَ عَوْدًا حُزَّ مِنْ شُفْرِ اسْتِهِ فَهَذَا أَوَانُ الْحَرْبِ شُدَّ عِصَابُهَا
فَلَا تَأْمَنَنَّا يَا بن أُمِّ مُجَالِدٍ إِذَا لَقِحَتْ حَرْبٌ[2] وَأَعْصَلَ نَابُهَا
وَلَوْ شَهِدَ البَطْحَاءَ مِنَّا عِصَابَةٌ لَهَانَ عَلَيْنَا يَوْمَ ذَاكَ ضِرَابُهَا[3]

[1] In İbn Hisham's *as-Sîratu'n-nabawiyya*: عَنَانِي وَلَمْ أَشْهَدْ
[2] In İbn Hisham's *as-Sîratu'n-nabawiyya*: اُحْتُلِبَتْ صَرْفًا
[3] One more couplet exists in İbn Hisham's as-*Sîratu'n-nabawiyya*:

We were not present in Makkah's Baṭḥâ and we did not witness when the men of Banu Ka'b had their throats cut and were left abandoned without being buried by the men of (Quraysh), without drawing their swords

Ḥassan b. Thabit started his poem with addressing the treacherous attack on Banu Khuzâ‘a. He highlighted that they were caught in the most vulnerable time of the night when they had no chance to draw their swords. The similar expression is also seen in the poem of 'Amr b. Salim al-Khuzâ‘î. The word "Baṭḥâ," which means a sandy wide valley, refers in the poem to a place near Mecca. And in that time this word was also used as a name for Mecca itself (Öğüt, 1994). The poet refers to Baṭḥâ as the location where Banu Khuzâ‘a was attacked and refers to Banu Ka‘b as Banu Khuzâ‘a, which is a branch of Banu Ka‘b, since their lineage traces back to Ka‘b b. Amr b. Rabî‘a (Musa, 2013).

Although the poet does not explicitly mention the attackers in the verse, he uses the term "men" to refer to them. However, in the continuation of the poem, from mentioning the names of three prominent leaders of the Quraysh who participated in the attack, it is understood that the poet is referring in the couplet to the Quraysh as the ones who took part in the assault.he lists three prominent figures from the Quraysh, indicating that he is referring to them as the perpetrators of the attack.

Ah, if only I had known! Would my help have defeated and punished Suheyl b. 'Amr and Safwan b. Umayyah from the tribe of Quraysh? Seek assistance from experienced warriors and saddle your horses! For now is the time of war, and the ropes are taut.

In the continuation of the poem, the poet directly targets the Quraysh by mentioning the names of three prominent figures among them, namely Suhayl b. 'Amr, Safwan b. Umayyah, and 'Ikrima b. Abu Jahl. These individuals covertly participated in the attack by concealing their faces and violated the terms of the Hudaybiya Treaty (al-Vâḳidî, 1965). The poet expresses his regret for not being able to give a devastating response to the prominent figures of the Quraysh who carried out the attack, as he was not present on the day of the assault. And he laments the missed opportunity to retaliate against them in a powerful manner. But in the contiunation of the couplet the poet challenges the Quraysh directly by calling on them to seek assistance from experienced warriors and prepare themselves for a fierce battle, mocking their horsemanship. By stating that the tensions have escalated, he indicates that this battle will take place in the near future (Husnî, 2005).

And you, O Ibn Ummî Mujâlid, never seek refuge when the battle breaks out and intensifies.

The poet, by mentioning Ibn Ummi Mujalid, refers to 'Ikrimah b. Abi Jahl Amr b. Hisham al-Makhzumi al-Qurayshi' from the Quraysh tribe who participated in the attack alongside Banu Bakr (İbn Hishâm, 1955). The poet expresses that the act they committed, by declaring that they would never seek forgiveness on the day of battle, is an unforgivable crime. He threatens the Quraysh members who participated in the attack with relentless revenge. As stated before his poem had a greater impact on the Quraysh than arrow wounds by threatining the Quraysh with merciless revenge and encouraging the Muslims to prepare for a fierce battle and the conquest of Mecca (Hazer, 2008).

If only a group from among us had been present in Batha that day, the battle would have been an easy task for us

The poet points the defenselessness of Banu Khuzâ'a by underscoring the unforeseen nature of the nightime assault, which exposing assailants weakness. He alleges that the presence of a group of fighters of them would have made the attack unfeasible and easily thwarted. So that, he diminishes their dignity, referring the views expressed by the Khuzâ'a poet concerning their limited numbers and cowardice. As the poet asserted, the Quraysh could not withstand the Muslims during the Mecca conquest, except for a minor clash.

Conclusion

Poetry has been widely seen in Arab society since the end of the 5th century. In history, just as every nation was superior in one field, the Arabs showed their superiority in literature and eloquence. These poems, in which they reflect feelings such as love, longing, joy, pain and anger, show that poetry has a very important place in classical Arab society, as well as being a historical document.

وَلَا تَجْزَعُوا مِنَّا فَإِنَّ سُيُوفَنَا لَهَا وَقْعَةٌ بِالْمَوْتِ يُفْتَحُ بَابُهَا

Do not have any doubt about us, for in our swords, for our swords have the echoes of death that open the doors to them.

In this study, the first poem examined caused an indignation by portraying a crucial event from the era of Sadr al-Islam. Its vivid imagery and sentimental appeal have aroused strong emotions among readers, highlighting the tragedy of the incident. The second poem, on the other hand, served as a powerful war instrument by giving courage and determination in Muslim warriors while weakening the morale of their enemies with its rallying cry and potent language.

Beyond its esthetic and storytelling features, the first poem serves as a communication instrument to express the cruelty committed by by the so-called allied enemies, igniting a sense of collective anger and a call for justice. The eloquent verses of the poem focuse the essence of the event, bringing it to life for readers and assuring its memory remains alive in the generations to come. Likewise, the second poem's role as a psychological weapon against enemy forces is of utmost importance. It strengthens Muslim warriors courage and commitment to win a victory over enemies victory while spreading fear and anxiety in their rivals by threatening with merciless vengeance.

These examples reveal the extensive impact poetry had during the era of Sadr al-Islam, serving as a vehicle for expressing deep emotions, gathering people together, and influencing the course of events. Poetry was more than a form of entertainment or artistic expression; it has a significant role in building public opinion, triggering and guiding the incidents and recording the historically significant events.

In conclusion, these poems highlight the power of poetry as a means of communication and war during the era of Sadr al-Islam. Its power to evoke strong feelings, to convey messages of encouragement and threat, and to act as a trigger to change the course of history clearly displays its indispensable role in the lives of people and reveals the cultural and historical landscape of that era of Sadr al-Islam.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Was the Medici Really the Most Powerful Family in Florence? Analysis of the Relationship Network of the 15th Century Florentine Merchant Families

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Abstract: In Florence in the 15th century, several families competed for power, during which they developed complicated business and family relationships. These families can be considered the big companies of the age. The results of network science have shown that a company's market power is determined not only by its financial and market positions, but also by its network position in the business network. The purpose of the research is to present the role of 15th-century Florentine families in their network of relationships and the resulting power position using quantitative methods. The research considers the business and family relationships of families as a multi-layered, complex network and examines them using network science methods. The research shows which families occupied the various positions of power in the complex network of relationships, and which families formed close groups within the network. One of the new areas of 21st century management is the network management, which focuses on examining the internal and external network of companies. The research examines the business positions of 15th-century Florentine families using the network management approach.

Keywords: Network science, Complex networks, Business networks, Market position, Power

Introduction

The using of management methods can give to companies an advantage over their competitors. After a while, these methods become widely known, can be mastered, and can be successfully applied. However, the more people use them, the less competitive they are. For this reason, the use of known methods is no longer an advantage, but its absence causes a disadvantage for a company. In the era of industrial management, the advantage could also come from the possession of resources. In order for a company to grow, it needed resources, and typically a company with more resources was more likely to grow. Typically manufacturing companies were able to make it more efficient with production management methods, and companies producing individual products with project management methods. After the advancement of the service sector, one of the keys to competitive advantage became the application of quality management methods. After the spread of the Internet, information became widely available in large quantities and quickly, resulting in a competitive advantage for companies that could learn and adapt more quickly. In this period, the application of knowledge management and change management methods became decisive.

In the late 1990s, a new field of science began to emerge, namely network science, which began to investigate real networks. The results of this new science opened a new perspective in the field of management, which is now increasingly used by companies. In the course of their activities, organizations establish various types of relationships with other market actors, and these relationships can be organized into a complex network that can be used to model the relationship system of the given business actors. The business network position of organizations can be revealed by analyzing this complex network. With the application of network science methods, a new field of management science was created, namely the network management. (Ford et al., 2002).

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This new management area examines the internal network of business organizations as well as the network of market organizations and looks for possible new types of competitive advantages based on this.

In the 15th century Florentine Republic, the different families were the actors of business life, we could say they were the big companies of the market at that time. These families competed with each other for political offices, business positions in order to gain as much power, and wealth as possible. Their power and business relationships strongly influenced their domestic and foreign business success (Molnár, 2022). In the leadership of the Republic of Florence, politics and business were closely intertwined, as the members of the guilds elected the supreme leader of the city. One of the best-known actors in the power struggle was the Medici family, which played a significant role in the political and economic life of Florence for three centuries from the 15th century. The Medici family was forced out of power three times, but in all three cases they were able to regain their leading position in the management of the city. The aim of the research was to use network science methods to analyze the relationship network of 15th-century Florentine families and to reveal how the power of the Medici family was related to their network position.

Literature Review

In the field of history, many historical research results are available from the 1960s, rise and fall of the Republic of Florence. We learned about the functioning of the Medici government from the works of Nicolai Rubinstein (Rubinstein, 1997), the world of the Italian city-states was presented in detail by the work of Daniel Waley (Waley, 1969), the country's political system. John M Nayemi (Nayemi, 1982) has researched the Florentine Republic. One of the first detailed studies on the relationships of Florentine families investigated the richest 116 Florentine families (Kent, 1978). Kent examined contemporary documents, including voter rolls, tax returns filed by families, business records, marriage certificates and personal correspondence. Breiger and Pattison investigated the relationship system of Florentine families using mathematical methods, and using Wille's formal concept analysis method (Wille, 1996) they presented the hierarchical relationships of families (Breiger & Pattison, 1986). They researched the business and marital relationships of Florentine families, based on Kent's research results. This research shows the hierarchical network relationships of families in the form of a graph. Out of the 116 families, they processed the data of the 16 most influential families and formed their relationships from this. In their research, individual families were taken as the unit of analysis, and in the case of financial relations, loans and business relations were also taken into account. During their sociological research, Padgett and Ansell used statistical methods to examine the relationships of different families according to aspects such as financial situation, friendships, employment and residential relationships, and based on these, they showed how the families formed different types of clusters. (Padgett & Ansell, 1993). Many historians have researched the history of the Medici family. In Hibbert's book, he presents the rise of the Medici family and discusses in detail the struggles with the rival Pazzi family (Hibbert, 1979). In Strathern's book, we get a comprehensive picture of the relationships of the Medici and the financial transactions relevant to the acquisition of power (Strathern, 2016).

Research into the development of social relationships between people in psychology began in the 1930s. In the field of human relations, the psychologist living in New York, Jacob Levy Moreno, developed the method of sociometry (Moreno, 1978). He observed that relationships between people are not randomly formed and distributed in an organization and are not the same as formal structural order, but the human relations create a network, which is a structure different from the organizational structure. However, Moreno only examined human relationships based on mutual sympathy. Mérei, who, in addition to relationships based on sympathy, also took into account opinions about social functions and abilities, developed the multi-point sociometric test (Mérei, 1996).

The next milestone in human network research was Stanley Milgram's experiment, during which he examined the network of social relationships (Milgram, 1967). He concluded that the average path length in the network of social relations between two randomly selected people does not reach 6 steps, and based on these, the principle of six degrees of separation became famous. It is interesting in the history of science that this phenomenon was first described not by a scientist, but by a writer. In Frigyes Karinthy's short story „Chains", the protagonist offers a bet to another member of the company. He claims that if someone names anyone in the world, he can reach him through only five connections (Karinthy, 1929). Although Karinthy was not a scientist, she was still very close to one of the basic principles of human relationship networks, the six degrees of separation. In human networks, the distance between two people is quite small, so networks with this topology are called „small-world" in network science. Later in network science, this term denotes a network with a specific topology. As a psychologist, Milgram only explored the small-world phenomenon inherent in human

relationships, but Watts and Strogatz created the network science model (Watts & Strogatz, 1998). In their research, they concluded that the small-world phenomenon appears not only in social networks, but also in natural and technological networks. Their mathematical model proved that neither random nor regular networks describe well the group formation properties of real networks. This refuted the earlier scientific position that human relationships are Erdős-Rényi random networks (Erdős & Rényi, 1956). In network science, the research of large groups of people brought another result, which affected several scientific fields, including economics. During his research, the Italian economist

Vilfredo Pareto noticed that the wealth distribution of Italy's population is asymmetrical. He found that people's income follows a power function distribution, according to which about 20 percent of the people receive 80 percent of the incomes (Pareto, 1964). Although Pareto was ahead of his time with his results, it became known in several scientific fields as the Pareto principle or the 80/20 rule. Practical experiences in the field of corporate management, quality management, and decision theory have substantiated Pareto's results, and management methods have been developed based on this. The 80/20 phenomenon has even been confirmed in the field of scientific publications. Derek de Solla Price examined the citations of scientific works and came to the conclusion that the number of references also follows this rule (Price, 1965). Price's results were also ahead of their time, but thirty-three years later a research also related to scientific references confirmed it (Render, 1998). In 1999, Barabási and his colleagues, researching the network topology of the Internet, came to the conclusion that the World Wide Web also operates according to a power-law distribution (Barabási & Albert, 1999). They defined the concept of scale-free networks and thereby defined a new type of network topology that, like small-world networks, is not only characteristic of human networks (Barabási, Albert, & Jeong, 1999). We now know that the Pareto phenomenon indicates the presence of a scale-free network.

Data

During my research, I used the relationship data of Breiger and Pattison, which they reduced to 16 families. and the data includes business and marital relationships between families (Table 1).

Table 1. The original table of connections (Breiger & Pattison, 1986)

	Business	Marriage
1. Acciaiuoli	.....	.....X.....
2. Albizzi	.....	.....XX.X.....
3. Barbadori	....XX..X.X.....	....X...X.....
4. Bischeri	......XX..X.....	......X...X...X.
5. Castellani	..X....X..X.....	..X.....X...X.
6. Ginori	..X.....X.....	.X.....
7. Guadagni	...X...X.....	.X.X...X.....X
8. Lamberteschi	...XX.X...X.....	......X.....
9. Medici	..X..X...X...X.X	XXX.....XX.X
10. Pazzi	.....X.....	.....X..
11. Peruzzi	..XXX..X.....	...XX.....X.
12. Pucci	.....	.....
13. Ridolfi	.....	.....X.....XX
14. Salviati	.....X.....	.....XX.....
15. Strozzi	.....	...XX.....X.X...
16. Tornabuoni	.....X.....	......X.X...X...

The relationships are symmetrical, which means that the business relationships do not contain information about the nature and direction of the business relationship between the two families. For example, if one family provided a loan to another family, it is not clear from the relationship who was the creditor and who took out this loan. In the same way, in the case of marital relations, it is not possible to identify that, for which family the husband belonged to and for which the wife. Of course, this information would be effective in a broader power investigation, since the relationship between the lender and the borrower is asymmetric in terms of power. In the same way, in the social hierarchy of the time, the power relationship between husband and wife in the family was asymmetrical. Since Breiger and Pattison's table shows that the Pucci have neither business nor marriage relations with the other families, I reduced the number of members of the inter-family network to 15 in my research.

Method

During my research, I used graph theory and network science methods. Although the network science uses the methods of graph theory, it is important to know that network science is not the same scientific field as graph theory. The essential difference is that network science examines real networks, while graph theory examines fictitious mathematical objects.

I created a multigraph from Breiger and Pattison's business and marriage data. In a multigraph, there can be more than one edge between two vertices, and the different types of edges have different properties. The edges in the multigraph that I was created can be business or marriage type relationships. I created a complex network from the multigraph. Complex networks have network layers, and each layer has the same nodes, but each layer has different connections (Kivela et al., 2014), and each layer represents a specific type of connection subnet (Figure 1).

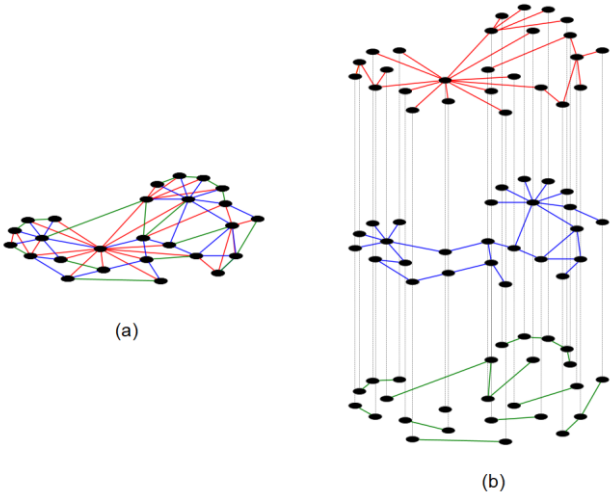

Figure 1. A multigraph (a), with three network layers (b). (Own figure)

The complex network I have created has two network layers, one contains marital relationships and the other contains business relationships. I investigated the properties of the complex network using quantitative methods I calculated the diameter of the network, the average degree, and the average path length, and used degree distribution to explore the topological properties of the network. I examined the groupings using natural clustering, and clique percolation methods. I calculated the degree centrality, the betweenness centrality, the closeness centrality and the pagerank of each node. I performed the calculations for the listed tests based on Barabási (Barabási, 2016). I drew the networks with the Yed network drawing software, and used the Gephi network analysis software for the quantitative network analyses.

Results and Discussion

To draw the networks, I created adjacency matrices of business (A^B) and marriage (A^M) relationships (Jungnickel, 2005). The individual families are in the rows and columns of each adjacency matrix, and the elements of the matrices indicate the relationships between them. The value of an element of the adjacency matrix is 0 if there is no connection between the families belonging to that element, and 1 if there is. If an element takes an integer value greater than one in the adjacency matrix, it means that the network is weighted or multigraph. If we add the business adjacency matrix and the marriage adjacency matrix, we get the adjacency matrix of the complex network as a result.

$$A^B + A^M = A^C \tag{1}$$

The adjacency matrix of the complex network is shown in Table 2. The value of 2 for the elements in this matrix indicates that there was an economic and marital relationship too between the given two families. This matrix is symmetric about the main diagonal because the connections are reciprocal, it contain values 0, 1 and 2, so the weights of the edges are different, therefore the complex network a directed and weighted network (Figure 2).

Table 2. The complex adjacency matrix of the fifteen families. (Own table)

	ACCIAIUOLI	ALBIZZI	BARBADORI	BISCHERI	CASTELLANI	GINORI	GUADAGNI	LAMBERTESCHI	MEDICI	PAZZI	PERUZZI	RIDOLFI	SALVIATI	STROZZI	TORNABUONI
ACCIAIUOLI	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
ALBIZZI	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0
BARBADORI	0	0	0	0	2	1	0	0	2	0	1	0	0	0	0
BISCHERI	0	0	0	0	0	0	2	1	0	0	2	0	0	1	0
CASTELLANI	0	1	2	0	0	0	0	1	0	0	2	0	0	1	0
GINORI	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0
GUADAGNI	0	0	0	2	0	0	0	2	0	0	0	0	0	0	1
LAMBERTESCHI	0	0	0	1	1	0	2	0	0	0	1	0	0	0	0
MEDICI	1	1	2	0	0	1	0	0	0	1	0	1	2	0	2
PAZZI	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
PERUZZI	0	0	1	2	2	0	0	1	0	0	0	0	0	1	0
RIDOLFI	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
SALVIATI	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0
STROZZI	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0
TORNABUONI	0	0	0	0	0	0	1	0	2	0	0	1	0	0	0

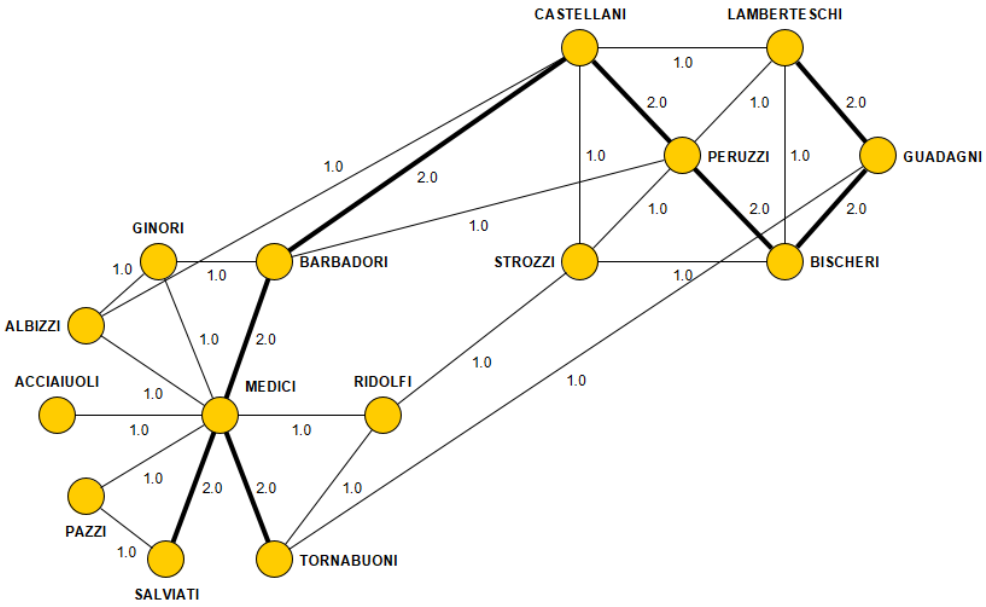

Figure 2. The complex network of Florentine families. (Own figure)

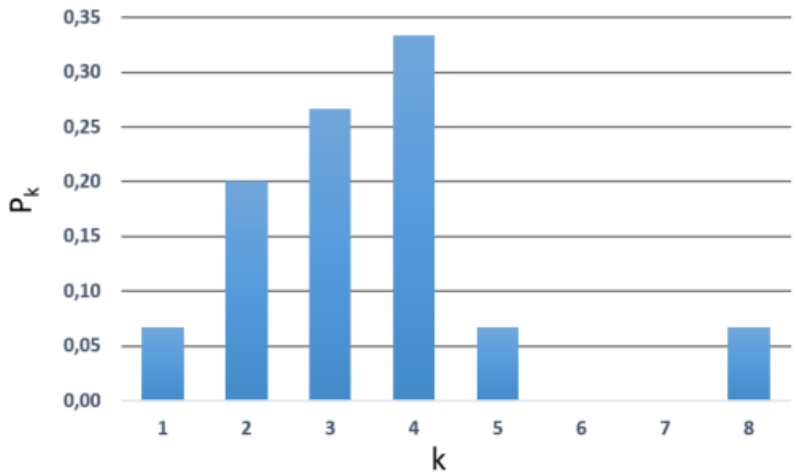

Figure 3. Degree distribution in the complex network of Florentine families. (Own figure)

The complex network has 15 nodes and 27 links, and the average degree is k_{avg} = 3,6. The degree (k) shows how many connections a node has. The diameter of the network is d_{max} = 4, which means the shortest distance between two arbitrary nodes. The average path length is d_{avg} = 2.09, so anyone in the network can be reached in just over 2 steps on average. In an Erdős-Rényi random network what consisting 15 nodes and 27 links, the d_{max} ~ 4 and d_{avg} ~ 2.49. From this, it can be concluded that the network of Florentine families does not have a random topology, but deviates towards a small-world topology, because it contains more connections with the same diameter. The topological properties of the network can be deduced based on the degree distribution (P_k) (Barabási, 2016). The result of the degree distribution also confirmed the small world nature. Figure 3 shows that the graph of the degree distribution shows an asymmetry on the right, which indicates a small-world deviation. The figure shows the degree numbers on the horizontal axis, and their distribution on the vertical axis.

I examined the network positions of individual families based on their centrality values. Betweenness centrality is a ratio that shows how many of the shortest paths pass through a given node. In a human network, we can infer the information position of a given node. The value of closeness centrality indicates the average length of the shortest paths starting from the given node, therefore, it shows how central someone is. Pagerank considers the importance of a node with the importance of its neighbors. The more important the neighbor is, the more it increases the importance of that node. The quantitative values of each node are listed in Table 3.

Table 3. The centralitiy values of the Florentine families. (Own table)

Nodes	Degree	Closness Centrality	Betweeness Centrality	PageRank
ACCIAIUOLI	1	0,40	0	0,03
ALBIZZI	3	0,52	4,33	0,06
BARBADORI	4	0,56	13,50	0,07
BISCHERI	4	0,42	2,58	0,07
CASTELLANI	5	0,52	9,83	0,08
GINORI	3	0,48	0,33	0,06
GUADAGNI	3	0,45	5,33	0,06
LAMBERTESCHI	4	0,42	3,67	0,07
MEDICI	8	0,64	44,08	0,15
PAZZI	2	0,41	0	0,05
PERUZZI	5	0,52	7,67	0,08
RIDOLFI	3	0,54	7,08	0,06
SALVIATI	2	0,41	0	0,05
STROZZI	4	0,50	6,25	0,07
TORNABUONI	3	0,52	9,33	0,06

The Medici has the highest value in all tests and is therefore the most defining node of the complex network. Barbadori is outstanding both in terms of its informational and central role, and it also plays the role of a bridge in the network. The other bridge is the Tournabuoni, which also has a good network position in terms of information flow. Acciaiuoli, Pazzi and Salviati occupy the weakest positions in the network, these families in the network are cut off by Medici from the rest of the network. In terms of information, Barbadori also occupies a good place in the network, which is because it is connected to a bridge and directly to Peruzzi. His position also stems from the fact that he has a business and marital relationship with both Barbadori and Peruzzi.

I performed a cluster analysis on the complex network, which showed which nodes of the network form common groups. First, I used Grivan-Newman's non-hierarchical, natural cluster analysis (Grivan & Newman, 2002). This algorithm classifies nodes into clusters based on betweenness centrality. The natural cluster analysis classified the nodes into three clusters. One group belongs to the Medici family, another to the Peruzzi family, and the third includes the Ridolfi and Tornabuoni families. These are connected to both other groups and thus connect the two large clusters, so they are the bridges in the network (Muisal & Juszczyszyn, 2009). It also plays the role of the Barbadori who are bridge in the network, but due to its position in the network, both cluster analyzes classified it as part of the Peruzzi cluster (Figure 4). The results of natural clustering were also confirmed by the CFinder clustering method. This algorithm classifies the directly related triple groups into a cluster (Derényi et al., 2005). The result of the CFinder method is shown in Figure 5.

The cluster belonging to Medici forms a fully centralized sub-network, while the Peruzzi cluster corresponds to shared network structures according to Baran's network typology (Baran, 1964). In Medici's centralized network, most vertices are directly connected to Medici, and there are few connections between nodes. Losing the central vertex would result in the network immediately collapsing into a disjunct network, In the Peruzzi cluster, a minimum of 2 nodes must be lost for the network to fall apart into non-connected sub-networks,

therefore it is more robust than the Medici one (Callaway et al., 2000). Therefore, the sub-network belonging to Medici was significantly more vulnerable than Peruzzi. In a rapidly changing market environment, from a network management point of view, the Peruzzi sub-network would have been much more efficient because it responds faster to changes and is more robust against targeted attacks and accidental errors than the centralized Medici. However, due to the slowly changing market nature of those times, this did not mean a market advantage for Peruzzi. Perhaps due to the Peruzzi cluster's better ability to tolerate disturbances, the Peruzzi network of connections remained even after the family's bankruptcy.

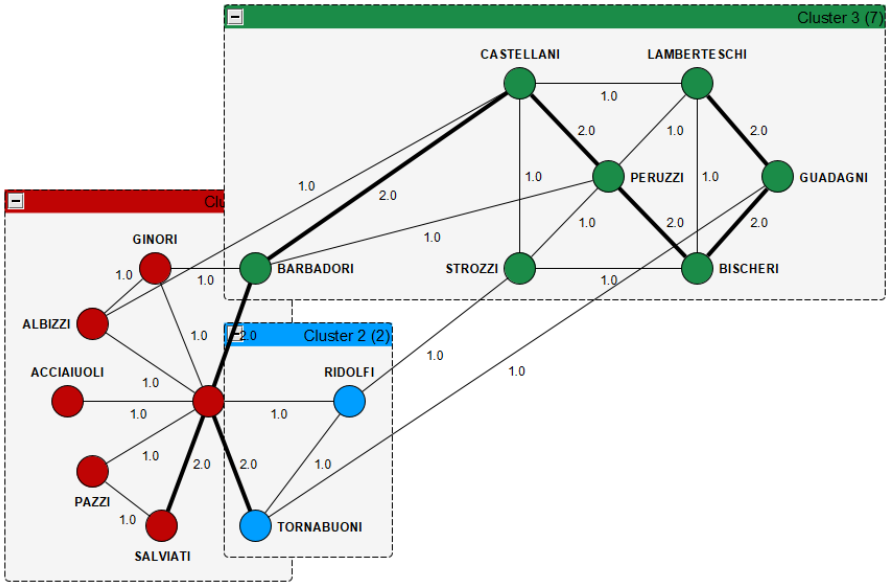

Figure 4. Result of the natural clastering methode. (Own figure)

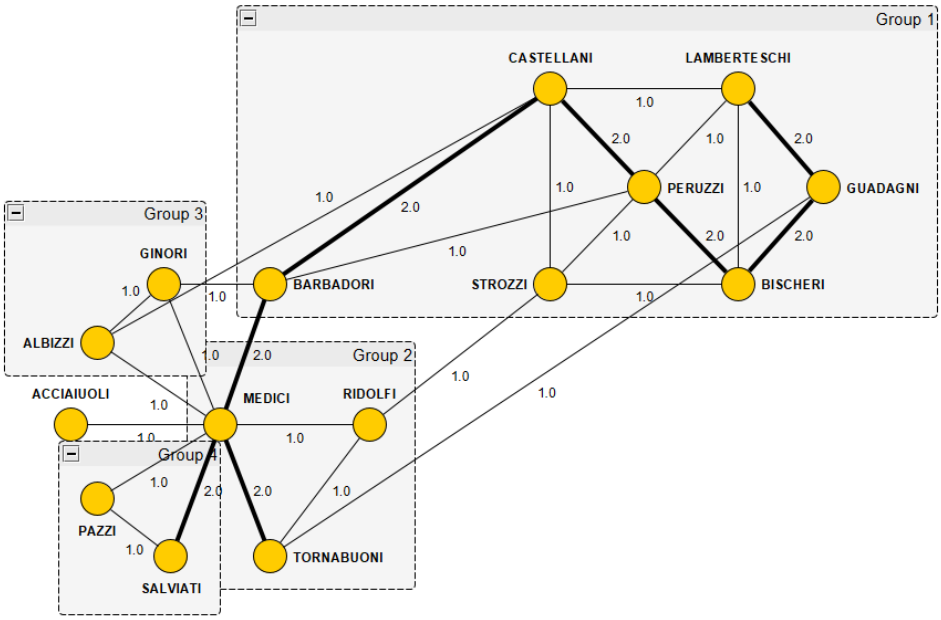

Figure 5. Result of the CFinder clastering methode. (Own figure)

Conclusion

The research examined the relationships of 15th-century Florentine families using network science methods. The aim of the research was to use network science methods to reveal the network position of Medici in the relationship system of Florentine families. In the process, based on business and marriage relationships, a complex network was created, the members of which are the 15 most influential families. The research explored the topological properties of this network and showed that overall, this network was a small-world network.

This was confirmed by the quantitative values of the network and the degree distribution. The two dominant families in the network were the Medici and the Peruzzi, around whom the other families in the network were arranged in clusters. The internal structure of the two clusters was completely different in terms of topology, Medici formed a centralized sub-network, while Pruzzi formed a strongly small-world type. As a result, the fall of the Medici from the network would have immediately resulted in the collapse of its sub-network, but even with the loss of 2 families, the Peruzzi cluster would have disintegrated only to a small extent. The Medici had to hold its cluster together with autocratic means and direct control, while the Peruzzi had to do indirect control. In the network of families, 3 families connected to the two clusters as a bridge, the Tournabuoni, the Ridolfi and the Barbadori. This held a particularly important network position, because on the one hand, it had a direct connection to both the Medici and Peruzzi, and on the other hand, it had business and marital ties to the two clusters. The research revealed that Medici's power also came from its network position. Based on his network indicators, it can be said that it was a central element of the network, and it had the greatest control over the flow of information in the network. However, the research also highlighted that the Medici relationship system was much more vulnerable than the Peruzzi was. If Peruzzi had known the network management methods, it would have been able to take targeted and effective action against the influence of the Medici and perhaps even regain its previous business position. Of course, this would have required Peruzzi's previous financial position, but based on the research, its network position would have given it the opportunity. Overall, it can be concluded that although Medici's network strength was great, its network position was very vulnerable.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

Notes

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The Criteria for Reliability

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Abstract: We conducted a large sample representative survey to get a deeper understanding of the Hungarian population's opinion on what makes them think a product or service is trustworthy. The main objective of the research is to design the Reliable Product Rewards Programme around a set of research-acceptable metrics that are valid and acceptable to all in 2021 and beyond. The University of Óbuda will participate in the development of the Reliable Product reward scheme in the future. When assessing the reliability criteria, 6 out of 10 factors were included. Based on the results of the research, it is proposed that the following 6 factors should be included in the Reliable Product reward system: 1. product value for money 2. product quality 3. recommendation by others (acquaintances, friends, family) 4. satisfaction with the product, after previous tasting/use 5. trial, during previous tasting/use. In our further research, familiarity will be considered as a separate dimension 0 as a filtering criterion in the reward system.

Keywords: Reliable product, Value for money, Product quality, Satisfaction, Product sampling, Recommendation

Introduction

Inspira Research conducted research on behalf of Product of the Year Ltd. on a representative sample of products to assess the characteristics and values of trusted products for consumers. Previous research has shown that the Hungarian population over 18 years of age is more reassured when an award is based on a public market survey. From a research point of view, it was considered appropriate to base the award of the Reliable Product Award on a large sample survey. Since in the long term, the possession of a Reliable Product Award has a major influence on consumer decisions, it was considered important to develop a set of indicators that are based on practical grounds but also take scientific aspects into account.

There is a large body of literature on the concepts of reliability and satisfaction. In many cases, synonyms for these concepts, such as trust and loyalty, also appear in the research, which are also important for the treatment of the topic. Trust is nothing more than the belief of the trusting party in a relationship that the other party (the trusting party) will not exploit the vulnerability of the trusting party in a business exchange (Morgan & Hunt, 1994).

There are researchers who argue that trust means something else: a willingness to act, the willingness of the trust-giver to engage in risky behaviour with a given partner in their relationship, behaviour that increases their vulnerability, their exposure to opportunistic behaviour by the partner. Trustworthiness is therefore nothing more than the perception and expectation of the trust giver of trust in relation to the trust receiver (Barney & Hansen, 1994; Mayer et al., 1995). Trust itself, in the traditional understanding, is nothing more than the individual's belief that his partner will not abuse his vulnerability (Korczynski, 2000).

The theoretical and empirical study of consumer loyalty has been popular in the international and domestic literature for more than two decades. For a long time, the debate has been about the importance of customer loyalty and there are countless scenarios on how to retain consumers and what positive effects it can have on the performance of organisations in B2C markets. Unfortunately, the same cannot be said for business-to-business (B2B) loyalty surveys. There is much less theoretical discussion and much less empirical research in this area (Hetesi, 2011).

Although loyal consumers are generally more satisfied, satisfaction does not automatically translate into loyalty. To unravel the satisfaction-loyalty puzzle, Oliver (1999) studies what aspects of consumer satisfaction affect loyalty, and what proportion of loyalty is attributable to satisfaction components? The conclusion of the analysis is that satisfaction is a necessary step in building loyalty, but many other processes are needed to acquire a loyal customer base. Although the majority of loyal consumers are satisfied, the data show that satisfaction is an unreliable predictor of loyalty. Nor is satisfaction-loyalty unambiguous according to relevant sources (Veres, 2008).

Hofmeister Tóth et al. draw attention to a more nuanced understanding of loyalty and customer retention: according to them, consumer loyalty and loyalty are static concepts, while customer retention is a dynamic concept, and the foundations of customer retention go back to transaction cost theory and social psychology (Hofmeister Tóth et al., 2003).

The role of qualitative research in scientific research has increased and changed, new methods are emerging and existing methods are being applied more intensively. This development has been prompted by the need to focus more on the why, the attitudes, the particular and the unique within the patterns of behaviour, which also means, especially in practical research, to gain as many characteristics and as complete a picture as possible of individual consumer behaviour and its driving forces. Academic research has also been influenced by this increased demand from practitioners, and by the fact that practical market research also conducts a lot of individual and group interviews, from which manufacturers and distributors are getting more and more information about the behaviour of even small groups of consumers and individuals (Simon, 2016).

Success indicators and research can play an important role in practical market research, instead of or in addition to measuring impact, i.e. not only measuring the effectiveness of measures (brand awareness, image, consumer satisfaction), but also the financial impact and success of the costs incurred, in particular the impact of marketing measures on ROI (Fischer et al., 2013).

Method

We conducted a large sample representative survey to get a deeper understanding of the Hungarian population's opinion on what makes them think a product or service is trustworthy. The research methodology was an online survey. The target group of the research was the Hungarian population aged 18 and over. The sample is representative of the population over 18 years of age, by gender, age, place of residence (region and type of municipality) and education level, so the conclusions drawn from the results can be generalised to the Hungarian population over 18 years of age. Data collection started at the end of September 2021 and ended at the beginning of October 2021. The sample size is n=600 individuals. The margin of error at the 95% probability level for a sample of 600 people. Multivariate statistical analyses were performed to assess the reliability criteria, of which the one with the strongest explanatory power was accepted. In factor analysis, we looked for groups of decision factors that were more closely correlated with each other, which variables could be considered to belong to a single factor.

Results and Discussion

When examining the criteria of reliability, 10 factors were included in the research, which, based on previous experience, are usually important factors when shopping. The decision factors included in the research were the following:

1. Product price
2. Product price/value ratio
3. Product quality
4. Product packaging

5. Product packaging size
6. Recommendations from others (friends, family, acquaintances)
7. Satisfaction with the product after previous tasting/use
8. Trial, during previous tasting/use
9. Product composition
10. Product manufacturer

The average importance of the factors included in the survey ranges between 4.4 and 3.1, indicating that the factors measured are of at least medium importance to the Hungarian population when purchasing food, basic household products and personal hygiene products. In the order of importance of the aspects influencing the purchase, value for money (or price), quality, satisfaction and product composition are above average. Recommendation came last, but is still a moderately important factor (Figure 1).

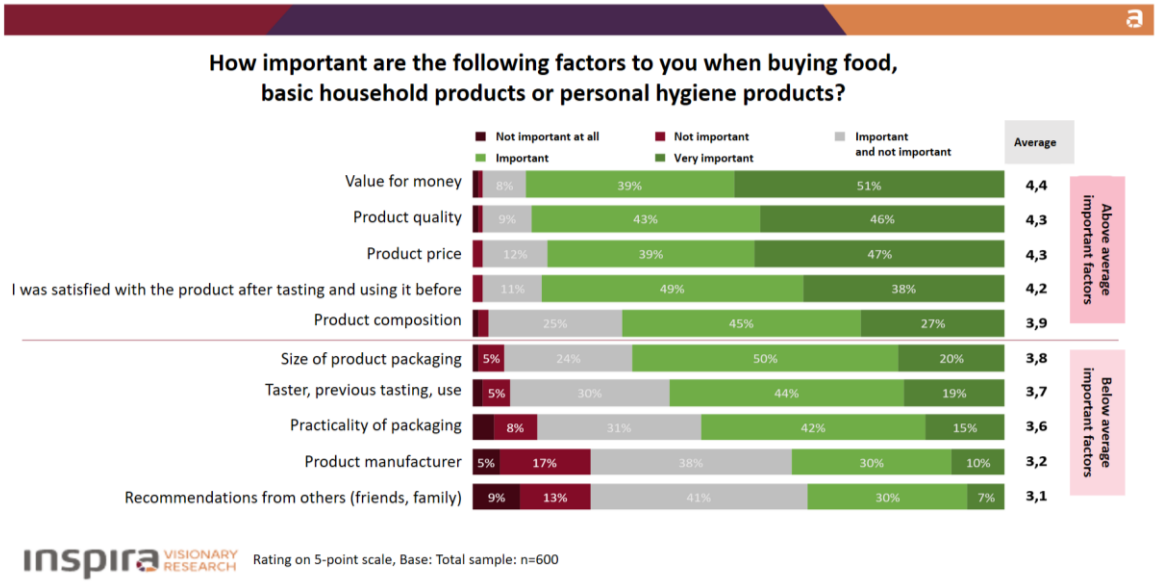

Figure 1. How important are the following factors to you when buying food? Basic household products or personal hygiene products?

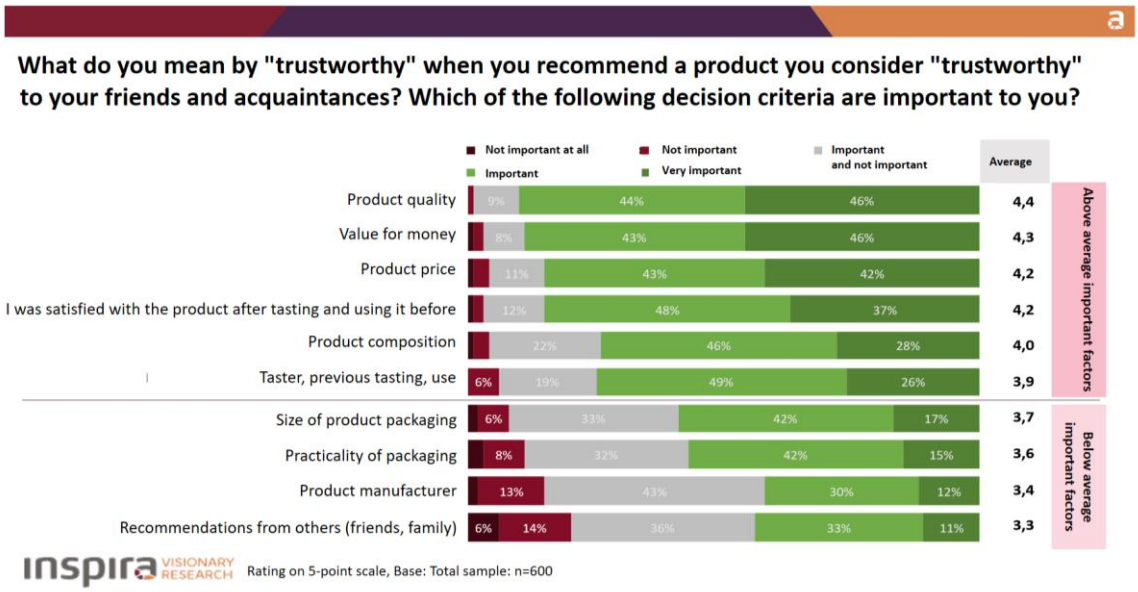

Figure 2. What do you mean by "trustworthy" when you recommend a product you consider "trustworthy" to your friends and acquaintances? Which of the following decision criteria are important to you?

The Hungarian population over 18 years of age perceives the quality, value for money (or price), satisfaction with the products, the composition of the products and the prior familiarity with the products as the key factors

for a reliable product. These are the factors that are of above-average importance to the Hungarian population and explain the existence of reliable products. The importance of recommendation is also ranked last, but here too it is of medium importance (Figure 2). When testing the reliability criteria, we performed multivariate statistical analyses, accepting the one with the strongest explanatory power.

In factor analysis, we searched for groups of decision factors that were more closely correlated with each other, which variables could be considered to belong to a factor. The essence of factor analysis is to generate a small number of new variables from several variables by exploring the relationships and latent structure between the original variables. The factors under study are grouped into 6 separate factors. The weight of each factor is determined by the percentage of the total variance explained by that factor. The results show that the factors of practicality of packaging and size of product presentation, and the factors of product manufacturer and composition of the product are grouped into a single factor, and thus these factors are highly correlated (Figure 3).

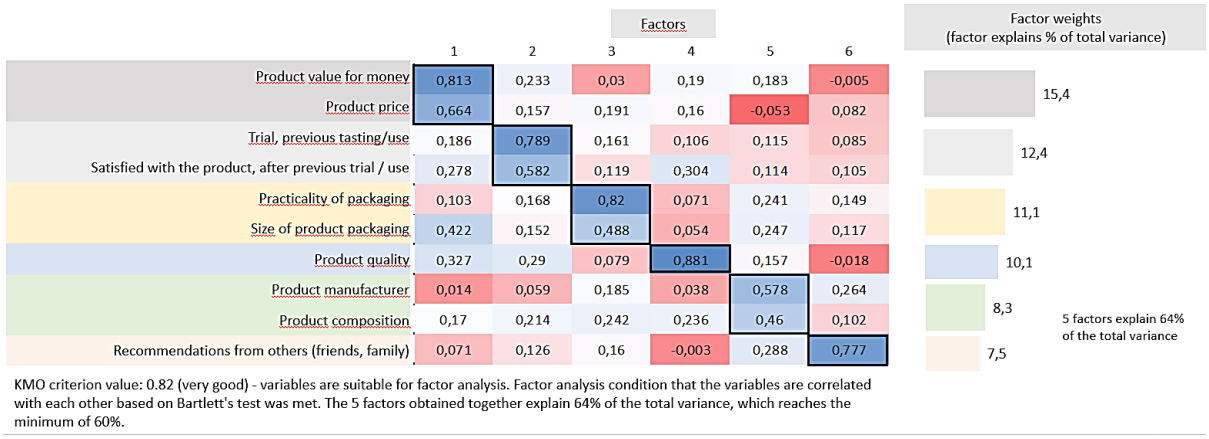

Figure 3. Result of factor analysis

Conclusion

Based on the results of the research, we propose that the following 6 factors should be included in the Reliable Product Award:

1. Product value for money
2. Product quality
3. Recommendation by others (friends, family, friends of friends)
4. Satisfaction with the product after previous tasting/use
5. Trial, during previous tasting/use

Based on our research experience, we suggest that in addition to the 5 dimensions defined above, awareness should be included as a separate “zero” (type of input) dimension as a filtering criterion in the reward system. Future research will examine the wording that is most clear to consumers. Together with this, we propose to remove from future studies the following items: 'practicality of packaging' and 'size of product', and the product's manufacturer and composition’

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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Analyzing the Self-Assessment on the Vocational Qualifications by Age and Gender: The Example of Geographic Information Systems (GIS)

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Abstract: Geographic Information Systems (GIS) are widely used in various sectors and disciplines. Therefore, many individuals of different ages and genders are currently employed in this area. Although specific vocational standards and qualifications are developed for professionals, individuals' self-evaluations, which are highly dependent on the diversity of variables, are essential for quality. Within this frame, this paper aims to analyze the self-assessment perceptions of graduates from GIS programs regarding age and gender. An online survey based on 43 performance criteria within the vocational qualification units was developed as the data collection tool, and the participants were requested to rate each criterion on a 5-point Likert scale. The average age of the 174 people who participated in the study was 35.75 (SD = 7), while the ages of the participants ranged from 23 to 53 (m = 35,75). There were 115 male participants (66.1%) and 59 female participants (33.9%). The results showed that there is not any relation between age and the self-efficacy levels of vocational qualifications ($p>0.05$). When the t-test results were examined for the comparison of the self-efficacy levels of vocational qualifications according to the gender of the participants, no significant difference was observed. To sum up, within the scope of GIS Specialist National Competence, the vocational qualifications self-efficacy perceptions of graduates from GIS are not affected by gender and are not related to age.

Keywords: Vocational qualifications, Gender, Geographical information systems, GIS Programs

Introduction

According to Burrough's (1998) explanation, Geographical Information Systems (GIS) involve a range of tools used to collect, store, query, transfer, and display accurate data on the Earth for a specific objective. In the following process, the concept of GIS has been broadened as a set of hardware, software, personnel, geographic data, and methods that fulfill the functions of collecting, storing, processing, managing, spatial analysis, querying, and presenting large volumes of geographic data to help users in spatial/location-based decision-making processes to solve complex, social, economic, environmental, etc. problems in the world (Unlu, 2019). Today, the availability of geospatial data and technologies, advancements in geographical data infrastructures, and the existence of web-GIS resources have made GIS an essential tool in modern society due to its simplicity and quick use.

To explain, GIS is a kind of technology that a variety of professional occupations need to handle geographical concerns in their specific sectors. GIS education and training activities have become even more important over the last 20 years regarding its widespread use and capabilities. Generally, the term "education" refers to the whole set of actions undertaken to educate individuals with expertise (Karademir, 2013). Bowlick et al. (2019) state that GIS education is often structured according to various curricula. In this regard, GIS is an interdisciplinary field that involves several information, knowledge, and skill categories. In other words, education in GIS consists of various components, such as teaching, study, learning, and evaluations. Therefore, each course within the different academic programs must have SMART goals. The meaning of having "SMART" course objectives—which stand for "specific, measurable, attainable, realistic, and time-bound"—a necessity for developing acceptable learning outcomes and evaluations (Hodza et al., 2021) should be understood. In this approach, the advantages of education in GIS include providing individuals with information, skills, and talents that are significant in the geospatial technology business and creating a preferred future. This highlights the need for a practical and open-ended conceptual framework to guide the consistent delivery of high-quality GIS education inside as well as across different fields of study and various institutions. The body of knowledge (BoK) about GIS is also continuously updated depending on discoveries and advancements made in GISystems, GIScience, and GIStudies.

Vocational qualifications are an essential factor determining the level and quality of the services received, making them an additional significant concern in the education sector. The level of vocational qualifications and the standard of vocational education have a close and direct relationship with each other. A vocational education should be designed and carried out in such a way as to include learning outcomes, spaces, equipment, and other opportunities that will provide the knowledge, skills, behaviors, and attitudes that will enable the profession to be performed in accordance with the minimum requirements (Cabuk & Cabuk, 2015). In other words, vocational education should be developed and carried out in a framework to include learning outcomes, spaces, equipment, and other opportunities. For this reason, assessing the qualifications through vocational education is important and necessary for understanding and bringing the sector and education priorities closer and continuously improving vocational qualifications.

For this reason, the level of professional competence individuals gain, or the competency of the teachers is measured/evaluated in different studies from different perspectives, such as gender, age, and educational background. Gender is one of the most investigated areas. For instance, according to a study examining future geography instructors' self-assessments, there was no significant difference between male and female participants in terms of their perceptions of their vocational qualifications (Karademir, 2013). Similarly, in a different kind of study that evaluated attitudes, researchers (Nugent et al., 2009) found no statistically significant difference between the self-confidence of male and female participants regarding completing GPS/GIS tasks. Moreover, according to the study that was conducted on geography course teachers by Cimen (2021), the responses given by men and women to the survey question "Do you find yourself vocationally qualified?" showed that there is not a statistically significant relationship between the gender variable and the evaluation of professional self-efficacy. However, within the scope of the same study, a statistically significant relationship was found between the "age variable" and "self-evaluation of professional qualifications." As a result of the analysis, teachers between the ages of 41 and 50 were the group that evaluated their vocational qualification levels as the highest in their self-evaluation (Cimen, 2021). Similarly, a meta-analysis (Weinburgh, 1995) of 18 studies found males to have more positive attitudes than females on their self-assessments.

There is a significant need for qualified GIS personnel in Turkiye. Because of the variety of GIS personnel employment calls from various sectors and projects, it is necessary to align the framework of GIS-related occupations with the minimum standards for GIS training and education programs. Each of these sectors requires an individual set of knowledge and competence. In this context, the term "competence" may be considered a concept that relates to the capabilities, knowledge, and skills necessary to carry out a task and complete the obligations required. It is now an unavoidable requirement and a quality indicator that the education provided at all levels, not just in GIS but also in other sectors, should supply the minimum amount of knowledge, skills, and competence intended to be obtained with that education.

Within this framework, this paper aims to analyze the self-assessment perceptions of graduates from GIS programs given by Anadolu University and Eskisehir Technical University in terms of age and gender. Studies in different fields have shown that self-assessment of professional competencies may vary depending on age and gender. As today's graduates are tomorrow's workers in the sector, whether the current picture of what has become a common tool for a wide range of fields, such as GIS, shows a gender and age-related change can guide decision-makers in terms of gender dynamics in both GIS and labor markets. For this reason, the results are expected to be used by the parties involved in both national policymaking and the education sector.

Materials and Methods

Material

An online survey produced using the learning outcomes and the success criteria described in the three qualification units of the GIS Specialist (Level 6) National Qualification (16UY0255-6) is the primary source material for this research. The information about the participants, including their personal and demographic details, as well as their degrees of GIS education, were gathered in the survey's four main sections. GIS Specialist (Level 6) National Qualification is broken down into three qualification units, which are as follows:

- A1: Workplace Health and Safety, Environmental Protection Measures, Quality Management Systems, and Work Organization;
- A2: Information Security, and
- A3: Technical Organization

Within the scope of the national qualification system, all national qualifications range from level 2 to level 6 and include an A1 unit that addresses workplace safety and health, environmental protection, and quality management standards relevant to the profession.

Method

Development and Implementation of Survey

The study involved analyzing and restructuring the learning outcomes specified in the A1, A2, and A3 qualification units of the GIS Specialist (Level 6) National Qualification. The aim was to create a set of survey questions that focused on individual learning gains. This resulted in expanding the original 38 criteria into 43 questions, designed to facilitate evaluations on a 5-point Likert scale. The scale ranged from 1 (indicating the lowest gain) to 5 (indicating the highest gain). An online survey utilizing the Google Survey Form was shared among graduates of various academic degrees, including the GIS-related certificate program, associate degree, master's degree (with thesis, without thesis, without thesis-distance education), and doctorate programs, which are offered by Anadolu University and Eskisehir Technical University. Participants were instructed to engage in a self-assessment exercise in order to evaluate their perceptions regarding the extent to which they have acquired the specified criteria throughout their education.

Evaluation of Survey Results

This study utilized a method of quantitative investigation to examine the disparities between gender/age and the knowledge and competencies acquired by graduates of target GIS programs within the framework of the qualification units of the GIS Specialist (Level 6) National Qualification. The survey methodology was employed to investigate possible differences in self-evaluations among individuals holding a degree in the GIS field by gender and age, utilizing a t-test. The survey model is a widely used descriptive technique in educational research by which researchers summarize features (such as skills, preferences, attitudes, etc.) of individuals, groups, or the physical setting (such as schools) (Fraenkel et al., 2012). The data analysis was conducted using the SPSS (Statistical Package for the Social Sciences) 21 software package. Normality assumptions regarding the usability of parametric tests were met in the data set created from different universities ($p>.05$). In the analysis phase, an independent sample t-test was used from descriptive statistics and from parametric tests to determine the differences between the independent variable of GIS Specialist (Level 6) National Qualification and program profiles. In addition, Pearson Correlation coefficiency was calculated for each qualification unit of GIS Specialist (Level 6) National Qualification.

Results and Discussion

Survey Participation and Descriptive Statistics

This section analyzes the graduates' assessments of their own GIS skill sets after completing their respective degree programs. Accordingly, the descriptive statistics obtained within the scope of the participants'

perceptions of GIS Specialist (Level 6) National Qualification Units (A1, A2, A3) are shown in Table 1. The data from the survey are almost symmetrical according to the skewness and kurtosis values.

Table 1. Descriptive statistics

	n	Minimum	Maximum	M	sd	Skewness	Kurtosis
A1	174	44.00	85.00	69.67	9.89	-0.159	-0.391
A2	174	13.00	35.00	25.82	5.59	-0.310	-0.199
A3	174	43.00	95.00	78.94	11.59	-0.375	-0.282
ALL	174	5.00	25.00	18.01	4.85	-0.380	-0.359

The participants of the study consisted of 174 volunteers residing in 41 different provinces of Türkiye who completed their graduation in Remote Sensing and GIS Programs between 1997 and 2022 and received an academic degree. Of the participants, 33.9% (f=59) were female, 66.1% (f=115) were male, and their ages ranged between 23 and 53. (sd=7.00; M=35.75).

Although the online survey was shared with over 800 graduates of GIS certificate, associate degree, master's degree (with thesis, without thesis, without thesis-distance education) programs and doctorate programs of Anadolu University and Eskisehir Technical University, only 174 people completed it thoroughly. When broken down by degree level, the results showed that 39.1% (f=68) of the respondents obtained an associate degree, 3.3% (f=4) a certificate, 23% (f=40) a master's degree with thesis, 4% (f=7) a master's degree without thesis, 34.7% (f=43) a master's degree without thesis (distance learning) and 6.9% (f=12) a doctorate.

Table 2. The relationship between GIS specialist (Level 6) qualification units and gender

	Gender	N	X	Sd	df	t	p
A1	Female	59	*68.78*	*10.07*	172	-0.852	0.395
	Male	115	*70.13*	*9.81*			
A2	Female	59	*25.42*	*5.61*	172	-0.662	0.509
	Male	115	*26.02*	*5.59*			
A3	Female	59	*78.86*	*10.72*	172	-0.063	0.949
	Male	115	*78.98*	*12.06*			
ALL	Female	59	*18.81*	*4.51*	172	1.568	0.119
	Male	115	*17.60*	*4.99*			

When the t-test results for independent samples for the comparison of qualification units according to participants' gender are analyzed in Table 2, none of the dimensions of A1 (t=-0.852, p>0.05); A2 (t=-0.662, p>0.05), A3 (t=-0.063, p>0.05) and ALL (t=1.568, p>0.05) create a significant difference.

Table 3. The relationship between GIS specialist (Level 6) qualification units and age

	Age	A1	A2	A3	ALL
Age	1				
A1	0.028	1			
A2	0.135	0.586**	1		
A3	-0.048	0.346**	0.390**	1	
ALL	-0.036	0.223**	0.378**	0.652**	1

**<0.01

When Table 3 is examined, it is seen that there is no significant relationship between the ages of the participants and their perceived competency levels in the GIS Specialist (Level 6) National Qualification Units (p>0.05).

Discussions

Self-assessments provide insight into an individual's vocational qualifications and career aspirations, and the impact of age and gender on vocational qualifications is an essential topic in today's workforce. When considering age, it is important to understand that vocational qualifications can be obtained through various pathways, including formal education, training programs, certifications, and work experience. Different age groups may exhibit variations in terms of access to educational opportunities, professional experience, and career progression, which can impact their self-assessment of GIS qualifications. Moreover, it is generally thought that older individuals may face barriers to using the skills of modern technologies. However, they also tend to have more work experience, which may balance out the disadvantage.

Secondly, gender is another critical factor to consider. Historically, specific fields, including GIS and other STEM (Science, Technology, Engineering, and Mathematics) disciplines, have been dominated by males. However, efforts have been made to promote gender equality and encourage female participation in these fields. Today, gender gaps still exist across different industries and levels of education. Women are less likely to attain vocational qualifications in fields that are accepted as male-dominated, such as construction and engineering. Statistical data reveals a significant gap in qualifications between genders in certain fields, highlighting the need for increased awareness and support for women in these industries. Additionally, supporting women in their vocational qualifications can advance their careers, benefiting both the individual and the organization. This benefits both individuals and organizations by creating a more inclusive and diverse workplace.

This analysis of vocational qualifications' self-assessments on GIS aims at understanding how different demographic factors can affect vocational qualifications. With this knowledge, creating a more equitable workforce could be possible. The results indicated no significant relationship between age and the competency levels defined in the qualification units of GIS Specialist (Level 6) National Qualification. Similarly, no significant difference was observed based on gender. Therefore, the study concludes that within the scope of GIS Specialist (Level 6) National Qualification, the perceived competency levels of GIS program graduates are not affected by gender and are not related to age.

Conclusion and Recommendations

The study is predicated on self-evaluation, and self-assessment of vocational qualifications refers to individuals' evaluation of their skills, knowledge, and competencies in a specific field. In other words, each individual evaluated the questions based on their perspective and indicated their proficiency level concerning the knowledge or skill. Analyzing self-assessment data is significant in providing insights into the distribution of vocational qualifications among different demographic groups, including age and gender. In summary, the vocational self-efficacy perceptions of GIS graduates within the GIS Specialist (Level 6) National Qualification scope stay unaffected by gender and indicate no correlation with age.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Game Development-Based Learning Approach to Teaching Programming in Upper Secondary Education: A Case Study

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Abstract: The CODING4GIRLS (C4G) initiative aims to prepare young learners, especially girls, for careers in computer science by promoting a game development-based learning approach to teaching programming. Using the C4G approach, students learn programming concepts through the development of serious games. After the effectiveness of the C4G methodology has been confirmed at the lower secondary level, the aim is to examine whether the application of this approach is also effective at the upper secondary level. This paper presents the results of a study that represents the beginning of research in this direction. The study involved a mixed-gender class of 15- to 16-year-old students from a school in Croatia who participated in learning activities based on C4G learning scenarios. They were expected to develop games using the programming language Snap!. The scenarios aimed to engage both boys and girls by addressing interesting topics and promoting problem-solving skills in real-world contexts. According to the results, the students accepted the process of developing games to solve real-world problems and were motivated to learn programming using this approach. Their teacher also commented positively on the effectiveness of the approach in achieving the learning objectives related to programming and its suitability for upper secondary students.

Keywords: CODING4GIRLS, Game development-based learning, Programming skills, Upper secondary education, Snap!

Introduction

Teaching programming is often challenging because it can be difficult for students to understand abstract concepts, terminology, or syntax, especially if they are beginners (Tuparova, 2019). Therefore, teachers try to incorporate various innovative methodological approaches in their teaching practices to help students learn programming concepts and to increase their learning motivation and engagement during classes. These approaches include teaching programming concepts through game-based learning (GBL) (Shabalina et al., 2017; Topalli & Cagiltay, 2018). GBL activities usually gradually introduce programming concepts and require students to solve interactive programming tasks that represent game levels. There are many games and tools that can be used to support the learning basic and advanced concepts using GBL approach that provide students with immediate feedback to learn from mistakes (Bauer et al., 2015; Holenko Dlab et al., 2019).

Another innovative approach based on games is game development-based learning (GDBL), which involves creating games (Papadakis, 2020; Rugelj & Lapina, 2019). GDBL activities can range from developing or modifying existing small games or missions for younger learners to developing games or even apps for phones and tablets where students apply all the programming concepts they have learned. It is important that complexity of the games should match the learning outcomes that students are expected to achieve. Since GDBL approach is application-oriented, students are more engaged in the learning process (Bewer & Gladkaya, 2022). To promote the acquisition of programming skills at an early stage, specific visual tools and programming languages such as Alice (Alice, 2020), App Inventor (App Inventor, 2023), Scratch (Scratch, 2023), Snap! (*Snap!*, 2023), Thinker (*Thinker*, 2023) have been developed. With these tools, students can easily create interactive stories and games, which positively affects their motivation for programming-related learning

activities (Holenko Dlab et al., 2019; Lau, 2018; Papadakis, 2020). Instead of writing text-based commands, students manipulate graphical elements (blocks) to create programs. Visual and game components have positive effects on learners' interest in computer science (Bewer & Gladkaya, 2022).

To facilitate the implementation of programming tools and the organization of GDBL learning activities, it is important to provide teachers with learning scenarios or educational sheets. GDBL scenarios can be inspired by real-world situations and promote critical thinking. Gender can affect student engagement in GBL activities, with girls preferring games that involve puzzles, fantasy, role-playing, stories, exploration, challenges, and problem-solving (Hosein, 2019), but are not fond of direct competition (Alserri et al., 2018).

CODING4GIRLS (C4G) (*CODING4GIRLS*, 2018) is a European initiative that encourages young students to acquire programming knowledge through GDBL and develop games that address real-world problems. CODING4GIRLS methodological framework for learing programming was developed within the project CODING4GIRLS, funded by the Erasmus+ Programme of the European Union under the Key Action 2: Cooperation for innovation and the exchange of good practices. The main aim of the development of the methodological learning framework was to make the computer science education and careers attractive to young students and thereby address the gap between male and female participation in this field (Hoić Božić et al., 2020). The fields of computer science and ICT have historically been dominated by men, both within the European Union (EU) and globally. According to (Wong et al., 2016), introducing programming in primary and secondary education is seen as a crucial factor in encouraging students to pursue further education in these fields. Therefore, the main objective of the project was to engage girls by increasing their understanding of the potential for professional and personal development that computer science provides. Additionally, the project aimed to advocate for gender equality and equip both boys and girls with programming skills, preparing them for future careers in computer science.

According to C4G methodological learning framework, students are motivated to create game-based solutions that tackle real-world challenges within the visual programming environment of Snap!. The C4G project also empowered educators with guidance on integrating the designed methodology and tools into their teaching practices and a set of learning scenarios and supporting instructional resources designed to emphasize the C4G approach, which promotes the acquisition of programming skills among girls. Using C4G learning scenarios, students begin by solving simpler problems and gradually progress to more complex ones, which ensures ongoing engagement and interest. Furthermore, students are presented with partially developed games that they must complete by implementing smaller modules, resulting in a meaningful product. This approach enables acquisition of necessary knowledge and skills to design and develop their own games for both, girls and boys, while fostering a constructivist approach to learning.

CODING4GIRLS approach has been shown to be effective for acquiring programming skills among 11- to 14-year-old students attending lower secondary school (Holenko Dlab & Hoic-Bozic, 2021) so the aim is to examine whether the application of the approach is also effective at the upper secondary level. To begin with research in this direction, the CODING4GIRLS approach was applied in one secondary school, with a group of 18 students aged 15 and 16 years, comprising both male and female participants who engaged in learning activities based on C4G learning scenarios. Paper presents the results obtained from the study and plans for further research.

Method

Following the CODING4GIRLS validation methodology (CODING4GIRLS, 2020) and the research methodology applied at lower secondary level (Holenko Dlab & Hoic-Bozic, 2021), the study described in this paper explores the effectiveness of the C4G approach to learning programming in upper secondary education in Croatia. As descriptive case study research (Yin, 2003), the presented research includes implementation of learning activities based on the C4G approach in one upper secondary school in Croatia. A combination of quantitative and qualitative methods was used to answer the following research questions:

RQ1) Do students consider the C4G methodology effective and appropriate for building programming skills?
RQ2) What is the difference in the students' perceptions regarding the level of their programming skills before and after C4G activities?
RQ3) Does teacher consider the C4G methodology relevant, effective, and appropriate for building programming skills among students aged 15-16 and why?

Participants

Participants in the study were teacher of informatics (NT =1) and her students (NS =18). This teacher has extensive experience in informatics and serves as a mentor for preschool teachers who are studying informatics at the University of Rijeka (UNIRI), guiding and supporting them during their teaching practice in informatics. She applied the C4G approach to building programming skills in a mixed-gender class with students aged 15 and 16 (N=18, 16 male, 2 female). The mean age of the participants was 15.11 years (SD =0.314).

In Croatia, there are two types of upper secondary schools: high schools, including gymnasiums where students acquire competencies (knowledge and skills) from general knowledge as a basis for further education at universities, and vocational schools, where the focus is on acquiring competencies needed in the labor market. In this case study, the focus was on gymnasiums. After successfully completing lower secondary education, students who choose to continue their education at a gymnasium can select the type of gymnasium that matches their interests, talents, and educational goals (e.g. general gymnasium, natural sciences and mathematics gymnasium, classical gymnasium, sports gymnasium).

The participants of this study were first grade students of natural sciences and mathematics gymnasium "Gimnazija Andrije Mohorovičića Rijeka" from Rijeka, Croatia. This type of gymnasium is enrolled by students who have an inclination or are even gifted in mathematics and computer science (especially programming) and was chosen to examine whether these students find it motivating to learn programming using the game development-based approach in Snap!. Moreover, this type of gymnasiums in Croatia are facing the problem of enrolling girls (the majority of students are male) which is an additional reason to investigate approaches that can contribute to greater motivation of girls to acquire knowledge in mathematics and computer science.

Study Procedure and Instruments

Activities for teaching programming using the C4G approach were organized during April and May 2022 as part of regular Informatics classes. The teacher was provided with learning scenarios based on the game development approach, developed by the project consortium (CODING4GIRLS 2020) and translated into the Croatian language. At the beginning of the study, students were familiarized with the C4G project and the GDBL approach to acquiring programming skills. They were asked to complete a preliminary questionnaire to determine their motivation for learning programming.

After completing the preliminary questionnaire, the GDBL activities were conducted. The teacher began each lesson with an introduction to the programming concept to facilitate student learning. Students had the opportunity to deepen their understanding of this concept through practical exercises. They were then given the task of creating a serious game that incorporated the programming concept they had learned using the C4G learning scenarios, while the teacher guided and supported them in solving the task.

Each C4G learning scenario provides a concise description of the learning activities required to create the intended serious game so that teachers can seamlessly incorporate them into their classroom practice. At the beginning of each document is information about the overall educational goal, concepts covered, specific learning objectives, and expected outcomes of the learning process. The main section of the scenario provides detailed step-by-step instructions for game development, while the final section includes assessment methods, discussion questions to encourage learner engagement, and a list of tools and resources for teachers and students. The collection of learning scenarios provided to the teacher covers basic programming concepts such as loops, conditionals, variables, statements, operators, events, and parallelism. Each scenario provides students with the opportunity to learn and apply one or more of these programming concepts by designing a game that addresses a real-world problem. To further encourage girls' engagement in programming, the topics of the real-world problems are chosen to be appealing to them. Examples include tasks like cleaning up trash in a park, promoting recycling, planning a picnic, and caring for animals at a shelter. A screenshot of a game created using one of the learning scenarios is shown in Figure 1.

After the GDBL activities, students were asked to complete the follow-up questionnaire to determine their perceptions of the C4G learning methodology. Both questionnaires also asked students to self-assess their current level of programming skills on the following scale:

0 - I have never coded or programmed before,
1 - I am a novice programmer (just have basic ideas),

2 - I can code simple programs,
3 - I am fluent in programming (can create a full program),
4 - I can design a solution of a problem in the form of a program.

Figure 1. Example of game developed in Snap! - Recycling

Both questionnaires were created using the Google Forms tool. The difference between students' self-assessed initial and final level of programming skills and the effect size were determined using Wilcoxon's Signed Rank Test for paired samples and Spearman's rank correlation ρ. The follow-up questionnaire assessed student satisfaction with the C4G approach and the organization of GDBL activities using the list of statements presented in Table 3 on a 5-point Likert scale (1 - strongly disagree, 5 - strongly agree). Student responses were statistically analyzed. In addition to the student questionnaires, the teacher reported in writing on student participation and engagement, as well as their own views on the relevance and effectiveness of the CODING4GIRLS approach.

Results and Discussion

Results of Preliminary Questionnaire

Preliminary questionnaire was solved by 18 students (16 males and 2 females) who self-assessed the level of their programming skills before C4G learning activities on the scale from 0 - I have never coded or programmed before to 4 - I can design a solution of a problem in the form of a program. Results are shown in the Table 1. Half of the students perceived their level of programming skills as level 2 - can code simple programs (50%), 11.11% perceived their level of programming skills as level 1 – novice programmers (32.51%) while others self-assess their level of programming with levels 3 (22.22%) and 4 (16.67). If we compare results by gender, it can be seen that only male students perceived their level of programming skills as level 3 and 4.

Table 1. Self-assessment of programming skills by gender

Level of programming skills	Male	Female	Total
0 - I have never coded or programmed before	0%	0%	0%
1 - I am a novice programmer (just have basic ideas)	12.50%	0%	11.11%
2 - I can code simple programs	43.75%	100%	50%
3 - I am fluent in programming (can create a full program)	25%	0%	22.22%
4 - I can design a solution of a problem in the form of a program	18.75%	0%	16.67%

Analysis of students' responses about motivators for learning programming are shown in Table 2. Students could choose one or more responses. According to the results, most of the students are motivated by success in the programming class (37.50%). Comparison by gender shows that the factor of showing other students programing skills motivates female students (100%) to a greater extent than male student (27.78%). Also, while both female participants want to follow a career in programming, only 38.89% of male students mentioned that factor. Among motivating factors males also mentioned enjoyment in solving logic problems and puzzles (27.78%) while 11.11% of them are not motivated at all.

Table 2. Motivation for learning programming by gender

Statement	Male	Female	Total
I'm not motivated	11.11%	0%	12.50%
I want to succeed in the programming class	33.33%	0%	37.50%
I want to show other students I can program	27.78%	100%	18.75%
I want to follow a career in programming	38.89%	100%	31.25%
I enjoy solving logic problems and puzzles	27.78%	0%	31.25%

Results of Follow-up Questionnaire

All 18 students (16 male and 2 female students) solved follow-up questionnaire and expressed their attitudes about the C4G activities using the 5-point Likert scale (1 – strongly disagree, 5 – strongly agree). Results show (Table 3) that both male and female students understood the presented concepts and felt engaged in this way of learning. They think that conducted activities were relevant for learning programming and it was clear what they had to do. Female students enjoyed programming to a greater extent and had (more) fun during C4G activities.

Table 3. Satisfaction with C4G approach

Statement		AVG	SD
I found programming challenging.	Male	3.50	0.86
	Female	3	1
	Total	3.50	0.90
I found programming motivating.	Male	3.44	0.93
	Female	4	0
	Total	3.50	0.90
I found programming easy.	Male	2.63	1.05
	Female	2.5	0.50
	Total	2.61	1.01
I enjoyed programming.	Male	3.25	0.90
	Female	5	0
	Total	3.44	1.01
I understood most of programming concepts.	Male	4.56	0.50
	Female	4	0
	Total	4.50	0.50
Learning this way is fun.	Male	3.50	1.22
	Female	4.5	0.50
	Total	3.61	1.21
I felt engaged with this way of learning.	Male	4.06	0.66
	Female	5	0
	Total	4.17	0.69
The activities were relevant to learn.	Male	3.75	1.30
	Female	3.5	0.50
	Total	3.72	1.24
At any time, it was clear what I had to do.	Male	3.94	0.75
	Female	4	0
	Total	3.94	0.70
What I learned will be relevant for my future.	Male	3.25	1.25
	Female	3.5	0.50
	Total	3.28	1.19

Table 4. The difference between the self-assessed initial level and the self-assessed final level of programming skill

	-2	-1	0	1	2	3	4
Male	0	6.25%	37.5%	37.5%	18.75%	0	0
Female	0	0	50%	50%	0	0	0
Total	0	5.56%	38.89%	38.89%	16.66%	0	0

The students also self-assessed the level of their programming skills again on the scale from 0 - I have never coded or programmed before to 4 - I can design a solution of a problem in the form of a program. Table 4 shows the difference between perceived levels of programming skill. A total of 55.56% of students stated that they

have progressed, most of them for 1 level (38.88%). 38.88% students stated that they are at the same level but most of them were students who initially self-assessed their skills with level 3 or 4. One student self-assessed their programming skills level higher before participating in C4G activities.

Table 5. The difference between the self-assessed initial level and the self-assessed final level of programming skill

Questionnaire	N	Mın	Max	Mean	SD	W	p	Effect size (Spearman ρ)
preliminary	18	1	4	2.44	0.92	4.5	< .05	0.62
follow-up	18	1	4	3.11	0.90			

Table 5 shows mean values and standard deviations, as well as the minimum and maximum values. The results of the Wilcoxon's Signed Rank Test for paired samples show that students self-assessed their programming skills significantly higher in follow-up questionnaire compared to preliminary self-assessment. Spearman's rank correlation (ρ) results indicate a strong effect size.

Teachers' Observations and Comments

After the implementation activities, the teacher was asked to express her qualitative opinion on the C4G methodology and the implementation process in a written form. The teacher expressed belief that the C4G methodology is very effective, not only with female students, but also with male students, even though it was primarily designed to popularize programming among girls. Teacher noted that the students seemed to acquire new knowledge and principles of logical reasoning without consciously realizing it because the methodology begins with simple problems and progresses to more complex ones, following a gradual approach.

As an advantage, the teacher stated the fact that the materials were fully developed and she received learning scenarios that she could simply use with students. She noted that after explaining the basics, students mostly came up with solutions independently. It is noteworthy that implementing this approach in natural sciences and mathematics gymnasium class made the implementation easy and straightforward.

The teacher acknowledged that some students already possess an inherent interest and motivation to acquire programming skills but by implementing this methodology, she managed to demonstrate to even the less enthusiastic individuals that programming is an attainable skill. Despite receiving comments from "experienced" students that some tasks were too simple for them, they still found themselves challenged by certain tasks, requiring them to invest additional time. Teacher reported that all participants actively engaged with the material, displaying genuine interest and even competing to solve tasks more quickly.

The teacher believes that such scenario-based approaches should be adopted in various disciplines, regardless of students' future careers, due to the rapid advancements in technology. Furthermore, she suggested the development of more advanced versions of these scenarios. Drawing from personal experience, the teacher emphasized that individuals already inclined towards programming do not require recruitment, as they have already made their decision. However, for those who are still considering their future profession, an experience like this can be a positive and enlightening one. The teacher didn't reported any technical problems that affected the implementation of the C4G activities.

Discussion

According to the results on *RQ1 - Do students consider the C4G methodology effective and appropriate for building programming skills?*, students expressed a positive attitude towards the GDBL approach based on the C4G methodology. Students feel that they have acquired programming skills and consider the approach both effective and suitable for learning programming. Thank to the clear instructions in the learning scenarios, they successfully developed games and found the process engaging and fun. Both female students enjoyed programming and had fun during C4G activities which shows that such activities have the potential to attract girls to programming.

Regarding *RQ2 - What is the difference in the students' perceptions regarding the level of their programming skills before and after C4G activities?*, the students' self-assessment of their programming skills showed a significant increase after participating in the C4G activities compared to their self-assessment before the activities. This effect is further evidence of the effectiveness of the GDBL activities in improving programming

learning. 38.88% of the students self-assessed their skills at the same level before and after the C4G activities. Since most of them were students who initially self- assessed their skills at level 3 or 4, this result is to be expected. It can be assumed that these students acquired programming knowledge and skills during their education in lower secondary school or through participation in extracurricular activities. Of the students who progressed, most of them progressed for 1 level (38.88%), while 16.66% of the students progressed for 2 levels. One student who self-assessed his programming skills level higher before participating in the C4G activities can be assumed to have been unrealistic in his initial self-assessment. Due to the small number of girls, the results related to RQ1 and RQ2 were not compared by gender. Further research with more (female) participants is needed to discuss gender differences related to these research questions in the context of upper secondary education.

The effectiveness of the approach is also confirmed by teachers' comments. Results related with *RQ3 - Does teacher consider the C4G methodology relevant, effective, and appropriate for building programming skills among students aged 15-16 and why?* indicate that the teacher has a positive opinion about the relevance, effectiveness, and appropriateness of the approach for students aged 15-16. According to the teacher, students were motivated to develop their own games, especially because the games involved solving real-world problems. According to the teachers' observations, the topics covered in the Snap! projects were captivating for both female and male students, which had a positive effect on their motivation to solve tasks and compete. The challenge of completing the game made programming an enjoyable experience even for more experienced students. This shows that the scenarios are well designed. If necessary, teachers can adapt them to the characteristics of their students and add additional game elements for more advanced students to challenge them.

Conclusion

This paper presents a study that investigates the effectiveness of game development-based learning for enhancing the acquisition of programming skills among first-grade students in natural sciences and mathematics gymnasiums in Croatia. The study employs the CODING4GIRLS methodology, which promotes the development of serious games in Snap! to prepare students, particularly females, for further education and future careers in computer science. During the study, the teacher and students applied C4G learning scenarios that required students to utilize programming knowledge and skills to solve real-world problems. The learning scenarios were designed to raise awareness of the relationship between ICT and the real world, covering topics of interest to both boys and girls.

The results of the study showed that the students embraced the process of developing games to solve real-world problems and were motivated to learn programming using this approach. It enabled them to achieve learning outcomes related to programming in a fun way. The teacher also provided positive feedback on the effectiveness of the approach in achieving the learning objectives related to programming. Additionally, the teacher reported that students actively engaged in the GDBL projects and were motivated to solve tasks. Therefore, the results indicate that the C4G methodology is suitable for students aged 15 and 16 years old.

A limitation of this study is the small number of research participants as well as the small number of female students in the class that was included in the study. Therefore, in future work, the research will be extended to a larger number of upper secondary schools and classes with larger number of female students. This extension will allow the effectiveness of the C4G approach to be examined on a larger sample and validate the findings of this study.

Recommendations

Based on the results of this study, it can be recommended to include GDBL activities for teaching programming classes because students find the opportunity to create their own games challenging, but also fun. They may be encouraged to finish the game by the fact that they can play it themselves or that other students can do it. GDBL activities should show students the possibility of practical application of programming skills in order to motivate them and stimulate their interest in programming. This can be achieved by designing tasks to solve real-world problems or create meaningful solutions that help them understand the importance of programming in practical contexts. Clear instructions for activities are essential for effective implementation of the GDBL approach, as is student access to all necessary materials and a supportive environment where they can enlist the help of peers or teachers when needed.

Ready-made learning scenarios offered to teachers can promote the use of effective methodological approaches. Each scenario should include clearly stated learning objectives and outcomes to assist teachers in selecting scenarios to use with their students. The variety of prepared scenarios saves teachers time and allows them to adapt teaching proces to meet the diverse needs of their students.

Girls are often less interested in education and careers in programming and ICT, so approaches like C4G should be used to engage them. Although the gap between male and female participation in these fields needs to be addressed, GDBL scenarios for teaching programming in mixed-gender classes should be designed so that the problems or topics covered are interesting to both female and male students. The effectiveness of the learning scenarios should be continuously evaluated, and based on the results and student feedback, modifications should be made to better meet student needs.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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An Investigation of Graduate Students' Views on Information Literacy

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Abstract: Information literacy, which is defined as the ability to access, evaluate, use and communicate information in different forms, has a special importance in every period of individuals' lives. The competencies sought in an information literate individual vary according to the level of education they are in; a linear relationship is established between the level of education and the areas of competence. The rapid development of technology and the subsequent information explosion have revealed the importance of qualified information, and societies have started to need individuals who access the right information, use it, produce and share it, and use technology effectively in these processes. It has become imperative for individuals to access the most up-to-date and accurate information in their own professional field. Information literacy qualifications of graduate students are of great importance in terms of both the studies they will put forward and their self-development. This study was carried out to determine the views of graduate students studying at a university in the 2022-2023 academic year affiliated to the Institute of Educational Sciences on information literacy. The information literacy interview form developed by the researcher was used as a data collection tool. Information literacy interview form developed by the researcher was used as a data collection tool. Content analysis was used in the analysis of the views of 20 postgraduate students affiliated to the Institute of Educational Sciences.Graduate students' views on the dimensions of information literacy were examined in the context of knowing, accessing, evaluating, using, ethical/legal issues. When the results of the research are examined, it is seen that graduate students see information literacy as the ability to use the stages of information literacy, determine the information they need when they encounter a problem situation, the sources of access to information are mostly the internet, question the accuracy of the sources in evaluating information, use information for academic development, and point out the presence of unrealistic information as a problem. In line with these results, it is suggested that information literacy should be added to the content of the research methods in education course, which is one of the courses taken by graduate students, and students should develop the skills of questioning the authenticity of the information obtained from the internet that they use in their academic development.

Keywords: Information literacy, Graduate students, Content analysis

Introduction

In the 21st century, continuous developments in knowledge and technology make it necessary to review existing knowledge and skills and to engage in lifelong learning. In this century, it is desired to raise individuals who are researching, problem solving, innovative, entrepreneurial, communicating, using technology, learning to learn and making learning a way of life together with information literate individuals who know how to access information.

This century has led to the "information age" with the awareness that people should be information literate (Farmer & Henri, 2008). The rapid development of technology and the subsequent information explosion have revealed the importance of qualified information in naming the period we live in as the information age, and societies have started to need individuals who access the right information, use it, produce and share it, and use technology effectively in these processes. It has become compulsory for individuals to access the most up-to-date and accurate information in their own professional field.

Literacy is a communication tool with a wide range of uses in various fields. For this reason, various definitions emerge. Information literacy, library literacy, computer literacy, technology literacy, media literacy and digital literacy are some of the types of literacy encountered. However, information literacy is seen as a combination of other literacies (Curzon, 1995) and a concept that encompasses other literacies (Breivik, 2000).

The concept of information literacy was first emphasized by Paul Zurkowski in 1974. In 1989, the American Library Association (ALA) revealed the importance of the concept of information literacy. UNESCO (2003) defines information literacy as the ability to identify and locate information in order to address questions and problems in a healthy way. According to Doyle (1992), an information literate person is aware of information needs, uses the right information, identifies information sources, uses technology to access information sources, evaluates the information obtained and uses it in problem solving. An information literate person knows the ways of accessing information and can use it appropriately (Henderson & Scheffler, 2003). An information literate individual should have all these characteristics and should continuously improve these skills. Information literacy, which includes the processes of acquiring, using and evaluating the information needed, is one of the most important concepts of scientific communication. The most important institution that is effective in gaining this skill is schools. However, since learning is a lifelong process, individuals should continue to use these skills at every stage of their lives.

Developments in information and communication technologies have enabled information to be presented in digital environments. This situation has led individuals to search for information in electronic environments. Electronic information sources provide individuals with the opportunity to access and store information (Al & Al, 2003). The most common tools that enable and support communication between individuals include computers, phones, tablets and televisions. Technological tools create a communication environment based on the Internet (Cantoni & Tardini, 2006). Web 2.0 is among the technologies used to teach information literacy (Godwin, 2009). This technology offers a social structure that enables the user to participate in the environment rather than presenting information (Kolbitsch & Maurer, 2006). Web 2.0 technology tools include web logs, player and video streaming subscriptions, Wikis, social networks, image and video sharing Web sites (Genç, 2010).

Different definitions, stages, models and standards have been proposed by different researchers regarding information literacy. Information literacy models systematically address and explain the stages to be followed in solving information problems. These stages are defined by Eisenberg and Berkowitz (1998) as defining the need for information, searching for information, finding information sources, using information sources, communicating information and evaluating information. In addition, different standards have been set for various levels including primary, secondary and higher education. ACRL's 2000 study "Information Literacy Competency Standards for Higher Education" has been a guide for the effective acquisition of science literacy by university students. According to the study, the competencies that an information literate student should have are examined in five standards. These standards include identifying the structure of information, accessing information, evaluating information, using information, and being aware of ethical, legal and socio-economic issues related to information and information technology.

The Information Literacy Competency Standards for Higher Education are designed to meet the expectations of students at all levels. The standards consist of performance indicators and outcomes (ALA/ACRL, 2000). In these standards, an information literate student demonstrates the ability to determine the nature of the information needed, access the information needed effectively and efficiently, critically evaluate information and its sources, use information effectively, and access and use information ethically and legally. These standards required for higher education are also required for graduate education.

Information Literacy literature is largely based on librarian-centered frameworks (Johnston & Webber, 2003). However, the number of studies on information literacy in the field of education is quite high in the literature. When these studies are examined, it is seen that they are related to teachers (Akkoyunlu & Kurbanoglu, 2002; Akkoyunlu & Kurbanoglu, 2004), prospective teachers (Akkoyunlu & Kurbanoglu, 2003; Aldemir, 2004; Kurbanoğlu & Akkoyunlu, 2002) and students (Caravello et al., 2001; Head & Eisenberg, 2010; Hunt et al., 2006; Mittermeyer & Quirion, 2003; Polat, 2005a; Polat, 2005b). When the studies on students are examined, it is seen that there are primary, secondary, higher education and graduate education levels. Information literacy skills are necessary for graduate students. Because students studying at this level use information literacy skill in their assignments, term papers, presentations and thesis writing. However, when the studies were examined, it was concluded that quantitative method was used and the information literacy skills of students studying at the graduate education level were not sufficient (Adeleke & Emeahara, 2016; Černý & Potančok, 2023; Dorvlo &

Dadzie, 2016; Kızıl, 2007; Lwehabura, 2018; Ozel, 2016; Polat, 2005b; Safdar & Idrees, 2021). Studies conducted with qualitative methods are not at a sufficient level (Lwehabura, 2018; Safdar & Idrees, 2021).

The study conducted by Lwehabura (2018), which aims to examine the information literacy skills of graduate students, showed that although there is information literacy among students, a large number of students have significant deficiencies in basic subjects such as applying various information seeking techniques. Safdar and Idrees (2021), in their study aiming to evaluate the information literacy skills of undergraduate and graduate students, showed that the majority of the participants were not sufficient in information literacy skills. The research conducted by Ozel (2016) was conducted to determine the perceptions of research assistants regarding their information literacy skill levels. As a result of the research, it was determined that the research assistants had difficulties in the sub-dimensions of information literacy. As a result of the research conducted by Polat (2005b) in which he investigated the difficulty levels of university students regarding information literacy, it was determined that there was no improvement in all aspects of information literacy skills of graduate students.

During their studies, postgraduate (PG) students take a large number of courses and are required to complete a large number of assignments. During this process, postgraduate students are required to conduct in-depth and comprehensive research. Therefore, it is important for graduate students to have sound knowledge and skills to use knowledge. Graduate study requires students to locate, analyze and interpret information and sources relevant to their field. This enables students to learn how to access, evaluate and use information. These skills can also be useful in students' professional life and other areas of their lives. Therefore, this study aims to examine the views of graduate students on their information literacy. It is thought that this study will contribute to the literature in terms of examining graduate students' experiences in information literacy. In this study, it was aimed to examine the views of graduate students on information literacy. For this purpose, it was aimed to examine graduate students' views on the definition of information literacy, their views on the dimensions of information literacy (knowing, accessing, evaluating, using, ethical/legal issues) and their suggestions on information literacy.

Method

Research Design

This study, which aims to determine the views of graduate students in terms of the dimensions of information literacy, was designed in phenomenology design. This pattern describes the meaning of the experiences that individuals have had regarding a concept or phenomenon (Creswell, 2007).

Study Group

The study was conducted at Eskişehir Osmangazi University in the academic year 2022-2023. Twenty graduate students studying in Educational Sciences participated in the study. Of these students, 12 are master's students, 8 are doctoral students, 13 are female, 7 are male, 3 are research assistants, and the others are continuing their graduate studies. In the selection of the study group, maximum variation sampling techniques were used from purposive sampling methods.

Data Collection Tool

Data were collected using a semi-structured Information Literacy Interview Form developed by the researcher. Before the interview form was created, the literature was reviewed and interview questions were prepared for the purpose of the study. Information literacy competency standards for higher education were utilized in the preparation of the questions (ACRL, 2000). Afterwards, it was submitted to expert opinions. The interview form included 7 questions about the definition of information literacy, opinions on the dimensions of information literacy (knowing, accessing, evaluating, using, ethical/legal issues) and suggestions on information literacy.

Data Analysis

In this study, the standards and stages specified by ACRL (2000) were taken into consideration in the interview form developed to determine students' views on information literacy and its dimensions and also in the

evaluation of the responses to this interview form. In these standards, an information literate student shows the ability to determine the quality of the information needed, to access the information needed effectively and efficiently, to evaluate information and its sources critically, to use information effectively, to access and use information ethically and legally. Postgraduate students' opinions on information literacy were analyzed by content analysis within the framework of the standards (knowing, access, evaluation, use, ethical/legal issues) specified by ACRL (2000).

With the content analysis technique, the answers given to the questions formed the data and the data were analyzed in depth. A 45-page transcript was obtained from the interviews. Each data was then coded with open coding, and then the codes were summarized and explained under categories and themes (Miles & Huberman, 1994). In order to ensure internal validity, the views of the graduate students were given in direct quotations, while in order to ensure external validity, the method of the research was tried to be defined in detail. For the reliability of the study, two researchers in the field of science education coded the data separately and these codes were compared by the researchers. No calculation was made in the comparison, and a few codes that did not fit were agreed upon. As a result of the comparison, it was seen that the level of agreement was close to each other.

Findings

The findings obtained in this section were examined within the scope of graduate students' views on the definition of information literacy, their views on the dimensions of information literacy (knowing, accessing, evaluating, using, ethical/legal issues) and their suggestions on information literacy (Table 1).

When the findings obtained in this section were examined in terms of graduate students' thoughts on the definition of information literacy, the students mostly expressed information literacy as the ability to use the stages of information literacy. Regarding this issue, a student (P5) expressed his/her opinion as follows: "In my opinion, information literacy is the ability to use the information about a subject in the right place, at the right time, to use it effectively, to evaluate it, and to be able to use the stages of accessing that information effectively when he/she needs information." Another opinion (P17) supporting this view was "Information literacy is the ability to access information on any subject, to distinguish accurate and reliable sources, to understand, interpret and use information." This opinion was followed by the ability to integrate information into one's life and to access reliable information. Other ideas were identified as the ability to distinguish between different types of information, awareness of finding information, an indicator of information literacy, the ability to solve a problem one encounters, knowing how to use the information obtained, investigating the accuracy of the information obtained, having a reading culture, a competence of individuals with research and questioning skills, and the way to access the information they need.

Graduate students' views on the dimensions of information literacy were evaluated within the framework of knowing, accessing, evaluating, using and ethical/legal issues. Students mostly determine the information they need when they encounter a problem situation. Regarding this issue, a student (P8) stated that "When I encounter any problem situation in daily life and I cannot find the right solution with the information I have, I decide when I need information." Another student (P14) who supported this view was "needing information, in my opinion, occurs when we encounter a problem and feel the need to solve it, as it is the basis of scientific research." This view is followed by the situation of lack of knowledge, reasoning, research, analyzing the current state of knowledge and natural flow.

Students' sources of access to the information they need are mostly the internet (library, web 2.0, online platforms). The opinion of a student (P15) on this issue is as follows. "I access the information I need in the 21st century through the internet". Another opinion (P17) supporting this view is as follows: "The information sources I can access are generally internet-based. This is followed by literature review (primary and secondary sources), people (experts and other people), scientific process skills (observation and experiment).

Students mostly question the accuracy of the sources in evaluating information. A student (P6) expresses his/her opinion on this issue as "I try to do research from places that can guarantee the accuracy of the source from which I obtained the information". Another student (P10) who supports this view is as follows: "I confirm the accuracy of the information by comparing it with different sources." This code is followed by intuition, interviews with experts, examining information features, questioning, knowledge accumulation, summarizing and filtering.

Table 1. Graduate students' views on information literacy

Theme	Category	Code	Frequency
Opinions	Definitions	Ability to use the stages of information literacy	7
		Integrating knowledge into your life	4
		Ability to access reliable information	4
		Ability to distinguish between different types of information	2
		Awareness of finding information	1
		An indicator of information literacy	1
		The ability to solve a problem one encounters	1
		Knowing how to use the information obtained and how not to use it	1
		Investigating the accuracy of the information obtained	1
		To have a reading culture	1
		A competence of individuals with research and inquiry skills	1
		The path followed to access the information they need	1
Dimensions of Information Literacy	Knowledge	In case of problems	5
		Where there is a lack of information	4
		Reasoning	4
		Conducting research	4
		Analyze the current state of knowledge	3
		In the natural flow	1
	Access	Internet	33
		Library	10
		Web 2.0	9
		Online platforms	8
		Literature Review	18
		Primary Sources	17
		Secondary Sources	1
		Contacts	12
		Expert person	8
		Other	4
		Scientific process skills	3
		Observation	2
		Experiment	1
	Evaluation	Querying sources	26
		Intuition	3
		Interviews with experts	2
		Analyzing information properties	1
		Inquiry	1
		Knowledge accumulation	1
		Abstract extraction	1
		Filtering	1
	Using	Academic development	13
		Personal development	12
		Problem solving	9
		Facilitating daily life	7
		Professional development	6
	Ethical/legal issues	Untrue information	10
		Difficulties in accessing information	8
		Proliferation of resources	7
		Information pollution	7
		Accepting information as true without research	4
		Plagiarism cases	2
		Lack of a mechanism to verify the accuracy of information	1
Recommendations	Add-ons	No suggestion	15
		Responsibility for information belongs to the person	1
		Including a research course in undergraduate education	1

	Improving information literacy	1
	Critical approach to sources	1
	Embed information literacy in programs from an early age	1

When the purpose of students' use of information is examined, it is seen that academic development is mostly emphasized. While one student's opinion on this subject (P15) was "To serve the subject I am researching", another student's opinion on this subject (P16) was "I use the information I need in tasks and projects related to my professional field and field of education". Academic development is followed by codes related to personal development, problem solving, facilitating daily life and professional development.

When the students' views on the problems related to information and information technology are examined, it is seen that they mostly state unrealistic information. While a student (P18) stated that "The biggest problem with this subject is the difficulties in accessing accurate and reliable information", another student (P5) stated that "With the rapid development of information and communication technology, while it has become easier to access information, it has become difficult to access and select accurate and valid information." and mentioned the difficulty of finding the original sources of information. Other opinions are difficulties in accessing information, proliferation of sources, information pollution, accepting information as true without research, plagiarism and lack of mechanisms to verify the accuracy of information.

When the suggestions of graduate students regarding information literacy were examined, it was seen that the students mostly did not specify any suggestions. The stated suggestions were that the responsibility for information belongs to the individual, research courses should be included in undergraduate education, information literacy should be developed, critical approach to sources, and information literacy should be placed in programs from an early age.

Discussion

In this study, graduate students' views on the definition of information literacy, their views on the dimensions of information literacy (knowing, accessing, evaluating, using, ethical/legal issues) and their suggestions on information literacy were examined. The results of the research are presented in this section. Graduate students see information literacy as the ability to use the stages of information literacy. Students determine the information they need when they encounter a problem situation. Studies supporting this result are found in the literature (Maybee, 2007; Polat, 2005). In a study conducted by Polat (2005), graduate students had difficulty in identifying and expressing their knowledge needs. Maybee (2007) mentioned that the way of experiencing information use described in the process category includes steps or stages that start with the realization of an information need. These results are similar to other research results. In addition, information literacy is defined as the ability to solve information problems (ALA, 2000).

Graduate students' sources of access to the information they need are mostly the internet. There are studies in the literature supporting this finding (Akkoyunlu & Yılmaz, 2005; Polat, 2005). In a study conducted by Akkoyunlu and Yılmaz (2005), it was determined that pre-service teachers utilized the internet for accessing information. In a study conducted by Polat (2005), it was revealed that graduate students have inadequacies in access issues. In particular, advanced search techniques on the internet and databases were mentioned among the difficulties. In addition, Li et al. (2007) mentioned that a training for using the Internet would be effective in providing information literacy skills to individuals. The findings of this study regarding the source of access to information coincide with the findings of other studies in the literature.

Graduate students question the accuracy of sources in evaluating information. Studies supporting this finding are found in the literature (Aldemir, 2004; Bruce, 1997; Maybee, 2006, 2007; Ozel, 2016; Polat, 2005; Webber et al., 2005). Aldemir (2004) also found that pre-service teachers were ambivalent about evaluating web resources in terms of various aspects such as timeliness, reliability, accuracy and objectivity. Bruce (1997) examined academics' views on information literacy and mentioned information sources as one of the seven concepts of information literacy. In a study conducted by Ozel (2016), it was determined that students had the most problems at the stages of "evaluating information critically", "evaluating information sources in terms of accuracy, reliability, impartiality and timeliness criteria" and "evaluating information in terms of quality and quantity". In a study conducted by Polat (2005), graduate students also have difficulties in the evaluation stage. The most difficult issues at this stage are the evaluation of information with criteria such as reliability, validity, impartiality and timeliness. This finding coincides with determining the accuracy of information, which is one of the qualities that students should have within the scope of information literacy (AASL & AECT, 1998).

Sayers (2006) emphasized the reliability of information as one of the most important concerns about information. It is important for individuals to have the ability to question the accuracy of the information they acquire. At this point, Li et al. (2007) emphasized that information literacy education programs that include the evaluation of information sources are very effective in providing information literacy skills to individuals. As a result, they obtained similar findings with other studies in the literature at the point of questioning the accuracy of sources in evaluating information.

It is seen that the purpose of postgraduate students' use of knowledge is academic development. There is limited research in the literature that is similar to this research finding (Safdar & Idrees, 2021). A study by Safdar and Idrees (2021) aimed to assess the information literacy skills of graduate and undergraduate students of one of Pakistan's leading national universities. The results of the study showed that a large proportion of the respondents felt that the information literacy program was valuable to meet their research and academic needs. This finding is in line with the finding of the current study.

The presence of unrealistic information is pointed out as a problem related to information and information technology by graduate students. There is limited research in the literature that is similar to this research finding (Polat, 2005). In a study conducted by Polat (2005), it was revealed that graduate students felt inadequate in obtaining and using information in ethical and legal ways. Information theft was emphasized among the issues they had difficulty with (Polat, 2005). This finding coincides with the students' qualifications of exhibiting ethical behaviors in the use of information and information technology and respecting copyright within the scope of information literacy (AASL & AECT, 1998). Graduate students did not have any suggestions regarding information literacy. The stated suggestions were that the responsibility for information belongs to the individual, research courses should be included in undergraduate education, information literacy should be developed, critical approach to sources, and information literacy should be included in programs from an early age.

Conclusion

When the results of the research are examined, it is seen that graduate students see information literacy as the ability to use the stages of information literacy, identify the information they need when they encounter a problem situation, their sources of access to information are mostly the internet, question the accuracy of the sources in evaluating information, use information for academic development, and point out the presence of unrealistic information as a problem.

Recommendations

Based on these results, the following suggestions can be made: Considering today's technological opportunities, it has become very easy for people to access information, but this convenience has also created the danger of spreading false or manipulative information. Therefore, since confirming the accuracy of the information needed in any subject is only possible with information literacy skills, it is necessary to spread the importance of this concept in society and raise the necessary awareness on this issue. In order to achieve this, information literacy should be added to the content of the research methods in education course, which is one of the courses taken by graduate students, and students' ability to question the authenticity of the information obtained from the internet that they use in their academic development should be developed. The needs of graduate students should be identified and an innovative information literacy course should be included in their programs. Graduate students can be provided with trainings on information literacy needs. A Web site that graduate students can use when they need information literacy can be designed. This study was conducted with the participation of 20 graduate students studying at Eskişehir Osmangazi University Institute of Educational Sciences in the 2022-2023 academic year. Other studies can be conducted with graduate students studying in different universities and programs. In addition, studies examining the information literacy of master's and doctoral students at the beginning, middle and end of graduate education can be designed. Studies that examine information literacy in research assistantship in depth can be planned.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Decoding Emotions: Harnessing the Power of Python for Sentiment Analysis in Social Media

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Abstract: Social media usage is increasing tremendously, and it has become a necessity. A person needs to be able to use social media in order to compete in this ever-developing world of technology's large number of people use social media, some for-entertainment purposes for educational purposes, Some for political, and others for economic purposes. To accommodate this tremendous amount of information that is being disseminated in social media to reflect the views of all these individuals. And all those views (information) have different sentiments echoed in them. To gain some data from the list of information, we need to analyze the feelings of the posts on social media. Sentiment analysis is a powerful tool that utilizes machine learning and natural language processing (NLP) to detect the sentiment - whether it be positive, negative, or neutral - in text. Two primary methods for conducting sentiment analysis are rule-based and automated. Convolutional neural networks (CNNs) and deep learning have been found successful in uncovering meaningful sentiments from texts, allowing for accurate classification of views expressed through written data. By breaking down each step thoughtfully with new ideas, active sentences instead of passive ones, stronger verbs for increased intensity, and synonyms to replace words that could be better used elsewhere, this makes up a successful rewrite of the original text.

Keywords: Sentimental analysis, Natural language processing, Speech detection, Jupyter

Introduction

Social media sentiment analysis seeks understanding how people feel about a product, service, or brand. It is an invaluable tool for businesses that are looking to gain insight into what consumers think of them. Manual data collection can be arduous and time-consuming due to the sheer amount of users and content available online; thus, machine learning models such as neural networks and deep learning algorithms offer efficient solutions for analyzing sentiments in large datasets. This paper will discuss a Python algorithm that provides an effective yet straightforward approach to sentiment analysis.

Related Work

Recently, automatically detecting hate speech has been widely studied by researchers. This section will review related works on traditional machine learning-based methods, deep learning-based methods, and multi-task learning-based methods of hate speech detection. Chen, (2012) proposed a variety of linguistic rules to determine whether a sentence constitutes hate speech or not. Gitari (2015) designed several sentiment features and achieved good performance in experiments. Previous studies have shown that sentiment features play an important role in hate speech detection. Deep learning-based methods have recently garnered considerable success in detecting hate speech (Krause & Grassegger, 2016). Mehdad and Tetreault (2016) extracted text's n-gram, character-level and sentiment features and used support vector machines (SVM) to detect hate speech. The semantics of hate speech contains a strong negative sentiment tendency.

The deep learning methods of predecessors often only used pre-trained models or deeper networks to obtain semantic features, ignoring the sentiment features of the target sentences and external sentiment resources, which also makes the performance of neural networks unsatisfactory in hate speech detection. Waseem (2016), stated that hate speech is very dependent on the nuance of language. Even if it is manually distinguished whether certain sentences contain hate semantics, a consensus is rare Del Vigna12 (2017) used the sentimental value of words as the main feature to measure whether a sentence constitutes hate speech. Artificial features can only reflect the shallow features of text and cannot understand content from the deep semantic features.

Our intuition is that most hate speech contains words with strong negative emotions, which are usually the most direct clues to hate speech. Meanwhile, as claimed by Davidson (2017). Sentimental analysis: It is not very easy (Kenyon Dean, 2018). Kshirsagar (2018**)** proposed a transformed word embedding model (TWEM), which had a simple structure but could achieve better performance than many complex models (Qian, 2018). A Lexicon-based sentiment analyzer was proposed to determine the polarity and measures for tweet data of a particular candidate (Nausheen & Begum, 2018).

Wang (2018) compared the performance of various neural network models in detecting hate speech and used visualization techniques to give the models better interpretability Zhang (2018) and fed input into a convolutional neural network (CNN) and a gated recurrent unit (GRU) to learn higher-level features. Rodríguez (2019) constructed a dataset of hate speech from Facebook and proposed a rich set of sentiment features, including negative sentiment words and negative sentiment symbols, to detect hate speech. Liu et al. (2019) introduced a novel formulation of a hate speech type identification problem in the setting of multi-task learning through their proposed fuzzy ensemble approach. Badjatiya (2019) found that due to the limitation of the training set, the deep learning model would have “bias” and he designed and implemented a “bias removal” strategy to detect hate speech. Multi-task learning can learn multiple related tasks and share knowledge simultaneously.

In recent years, there have been some achievements in hate speech detection. Ousidhoum (2019) presented a new multilingual multi-aspect hate speech analysis dataset. Its Challenging due to the inherent complexity of the natural language constructs. Most of the existing works revolve either around rules. Kapil and Ekbal (2020) and propose a deep multi-task learning (MTL) framework to leverage useful information from multiple related classification tasks in order to extend the performance of hate speech detection. Tekiroglu (2020) constructed a large-scale dataset based on hate speech and its responses and used the pre-trained language model, GPT-2, to detect hate speech. Obviously, deep learning models can extract the latent semantic features of text, which can provide the most direct clues for detecting hate speech. In this work, we approach suicide counselling aiding from a more practical aspect. Instead of creating a chatbot to replace human counsellors, our goal is to propose a model for suicidal ideation detection (Ji, 2021) for cross-modality interactive learning. The study of ordinal suicidal ideation detection Sawhney (2021) designed an architecture including Bi-LSTM layers, temporal attention layer, and ordinal regression layer, to comprehensively analyze the posts from the past. Then, they adapted C-SSRS to make an assessment of suicidality.

Verma (2022) addressed the application of sentiment analysis to build a smart society based on public services. Xiao (2022) exploit the self-attention mechanism combined with densely connected graph convolutional networks to learn inter-modality dynamics. Latifian (2022) was conducted to delve into the bipolar patients' family experiences of the outcomes of encountering stigma. Sun (2022) verify the correlation between social network characteristics, Weibo textual sentiment characteristics, and port forwarding. Various perspectives are taken into consideration in order to determine the impact of social media on the public, police and government with the help of face recognition technology. Sushith, (2022) and Tania (2022) focus on thinking aloud or screaming inside: an exploratory study of sentiment around work.

Sentimental juxtaposition revealed through the labelled data set was supported by the n-gram analysis as well. Shu (2022) attempts to identify consumers' opinions on the health impact of online game products through non-structured text and large-size social media comments. The research of Joloudari (2022) and Upadhyaya (2022) conclusively demonstrate the superiority of BERT models over other deep learning architectures in sentiment analysis. The former study leverages such models to identify denier statements on Twitter, accurately classifying tweets into either a believer or denier stance towards climate change. A sudden change in the stock movement due to COVID-19 appearance causes some problems for investors. From this point Sharaf (2022) propose an efficient system that applies sentiment analysis of COVID-19 news and articles to extract the final impact of COVID-19 on the financial stock market. Lokala (2023) analyze the substance use posts on social media with opioids being sold through crypto market listings.

Material and Methods

For building the algorithm we will be using python programming language. The program will be coded on Jupyter notebook due to the reason Jupyter Notebook allows users to compile all aspects of a data project in one place making it easier to show the entire process of a project to your intended audience. The first step is encoding a list of emotions with their enormous lists of examples into the algorithm. The second step is giving the model a text post to be analyzed. The algorithm will have functions that will eliminate white spaces, punctuation marks, pronouns, conjunctions as such words will not have any impact on the overall emotion depicted on the text. The overall all text will then be converted to a lowercase letter for a consistent and smoother working of the algorithm then the text will be split into a single word and all of the words will be stored inside an efficient data structure.

The Algorithm will loop through each line and then checks if the words inside the emotion.txt file are also present inside the collection of words from the previously cleaned file, if a word from a specific emotion is found it will increment a counting variable and after going through all the files it will then display a graph based on the found information. The sample emotions given to the algorithm consists of happy, Angry, sad, delusional, satire and as such. Please refer Table 3.1 and 3.2.

Table 3.1. List of sample positive emotions used by the Algorithm

Joy	Gratitude	Love
Satisfaction	Serenity	Interest
Amusement	Affection	Attraction
Affection	Excitement	Happy
Ecstasy	Love	Thrilled

Table 3.2. List of sample Negative emotions used by the algorithm

Anger	Fear	Guilt
Shame	Anxiety	Loneliness
Sadness	Disgust	Depression
Agony	Agitation	Happy
Sad	Rage	Melancholy

And after analyzing the texts the output gave the percentage of each of the emotions available and finally generalize the true intention of the post. Please refer to the image 3.3.

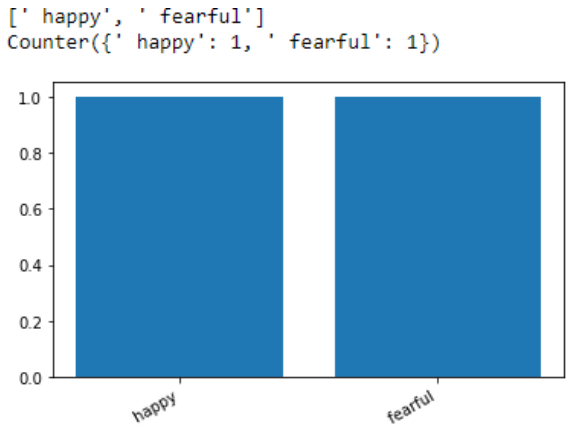

Figure 1. Output graph of the Algorithm after analyzing an emotion-based text

Results

Datasets and Evaluation Metrics

After programming, the input was fed to the algorithm and the following outputs were found. The datasets given to the model are carefully selected text posts that include almost all emotions available and they are supposed to reflect the view and opinions of majority of extreme social media users. Please refer to the table 4.1.

Table4.1. Example of the questionnaire used to gather the datasets from the public

Sample text	Positive emotion	Neutral emotion	Negative emotion
1	….	…..	…..
2	….	…..	…..
.	.	.	.
.	.	.	.

A survey will be conducted on 100 random individuals who are substituted from different walk of life and they will be requested to rate the sample texts from a range of 1 to 10 based on the feelings they felt when they read the texts, the gathered information is then tabulated and catalogued. Please refer to the table 4.2.

Table 4.2. List of example of sentences the Algorithm is will be able to analyze

Sample text 1	I am thrilled that my new job starts Monday!
Sample text 2	You are stupid and delusional, Get out of my face.
Sample text 3	I am not quite sure I will let you know if it is possible or not.
Sample text 4	Covid vaccination is deadly and unorthodox as it can cause…
Sample text 5	If voting changed anything, they would make it illegal
Sample text 6	She trembled with fear when she find out the door was not locked all night.

The evaluation metric is conducted by comparing the algorithm output with the survey conducted earlier, then the two outputs are compared and the output was as follows. Based on the comparison of the two outputs it is concluded that the model is 95 % effective. Since the error margin is less than 5 % it can be said the AI model works as intended and it is successful.

Discussion

After properly following the methodology, the output of the model was found to be highly accurate with a 95% success rate. This algorithm could accurately detect hate speech and also identify what type of emotions it evoked in text-based social media posts. When this innovation was implemented on a local website customer service page, they observed an improvement in their services as well as better customer satisfaction due to its low complexity and high efficiency. The advantages of this model are manifold - from being easy to implement and maintain, compared to complex models that require substantial time for training; upscaling emotion lists so that more feelings can be detected easily; incorporating image or voice based posts etc., there is much potential for further development. On the other hand, one major limitation lies in its inability to work beyond text-based social media posts which restricts its application range significantly. Considering these aspects of this model, future work must focus on integrating both image and voice based postings along with providing greater accuracy by increasing emotion list size thereby improving prediction results even further.

Conclusion

The research centers on Natural Language Processing and Sentiment Analysis using Python. This algorithm is simple, fast, and efficient in gauging emotions from a given text. It can be integrated into any program or webpage as a web-based application with ease. However, there are some drawbacks to this method such as the difficulty of recognizing true context when negative sentiment is expressed through backhanded compliments -

resulting in an overestimation of positive feedback. Additionally, this algorithm cannot identify sarcasm, negation, grammar mistakes or irony; making it ideal for analyzing data gathered from social media platforms but not suitable for others forms of communication like voice recordings and image files. To improve upon these limitations further exploration should be done on refining the ability to detect nuances while processing complex language structures including different tones and dialects used by people all over the world – ultimately leading to more accurate results when performing sentiment analysis tasks using Python algorithms.

Appendice

```
import string
from collections import Counter
import matplotlib.pyplot as plt
text=open('read',encoding='utf-8').read()
lower_case = text.lower()
cleaned_text =lower_case.translate(str.maketrans("",string.punctuation))
tokenized_words=cleaned_text.split()
##print(tokenized_words)
stop_words = ["i", "me", "my", "myself", "we", "our", "ours", "ourselves", "you", "your", "yours", "yourself",
"yourselves", "he", "him", "his", "himself", "she", "her", "hers", "herself", "it", "its", "itself", "they", "them",
"their", "theirs", "themselves", "what", "which", "who", "whom", "this", "that", "these", "those", "am", "is",
"are", "was", "were", "be", "been", "being", "have", "has", "had", "having", "do", "does", "did", "doing", "a",
"an", "the", "and", "but", "if", "or", "because", "as", "until", "while", "of", "at", "by", "for", "with", "about",
"against", "between", "into", "through", "during", "before", "after", "above", "below", "to", "from", "up",
"down", "in", "out", "on", "off", "over", "under", "again", "further", "then", "once", "here", "there", "when",
"where", "why", "how", "all", "any", "both", "each", "few", "more", "most", "other", "some", "such", "no",
"nor", "not", "only", "own", "same", "so", "than", "too", "very", "s", "t", "can", "will", "just", "don", "should",
"now"]
final_words=[]
for word in tokenized_words:
    if word not in stop_words:
        final_words.append(word)
emotion_list = []
with open('emotions', 'r') as file: for line in file:
clear_line = line.replace("\n", '').replace(",", '').replace("'", '').strip()
      word, emotion = clear_line.split(':')
        if word in final_words:
            emotion_list.append(emotion)
print(emotion_list)
w = Counter(emotion_list)
print(w)
# Plotting the emotions on the graph
fig, ax1 = plt.subplots()
ax1.bar(w.keys(), w.values())
fig.autofmt_xdate()
plt.savefig('graph.png')
plt.show()
```

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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The Way to Develop a Project Mindset according to Secondary School Students

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Abstract: The 21st century has brought many changes to our lives. The pandemic and the major changes that followed have affected our daily lives. Many competences have come to the fore that were previously secondary in the world of work. These competences include project thinking and thinking in terms of projects. Project thinking is not a stand-alone concept, but a complex set of competences that encompasses a number of other competences. It includes teamwork, communication, time management, insight, flexibility or even agility and time management. A project approach is nowadays not only needed in the world of work, but many school tasks can be defined as projects, leading students to succeed in real life. The aim of this study is to present the project approach and its different dimensions, based on the perceptions of secondary school students and the results of a questionnaire survey. The paper aims to shed light on the different aspects of the project approach, highlighting the areas and directions that need improvement and which could be the key to the future.

Keywords: Project, Project approach, Education, Efficiency, STEM

Introduction

Many events in our lives can be understood as projects that we plan, organise, implement, control, if not consciously, and finally conclude with lessons learned. In order to manage these events well, we need a number of competences and background knowledge (Csiszárik-Kocsir & Varga, 2017). If we treat these events as projects and call the stakeholders stakeholders (in a narrower sense, the stakeholders are the project team), communication, problem solving, teamwork are essential, but time management is also important in many cases. Effective communication is key to collaboration between teams working on a project. You need to be able to communicate project objectives, task expectations, deadlines and potential challenges well. All this needs to be presented and communicated to everyone involved in the process. Many tasks and deadlines need to be managed throughout the project. Time management skills will help you to plan each workflow effectively, define key steps and set priorities. Projects are usually carried out in teams, so the ability to work effectively in teams is also important. You need to be able to collaborate with others, delegate tasks, share responsibilities and support team members (Varga, 2021). It is also important to manage conflict and give constructive feedback. Challenges and problems often arise during the project. It is important to identify and solve these problems, which may require flexibility, creativity and analytical thinking. However, these competences are often not innate. We learn and experience the need for them through tasks in our lives. The role of secondary education is important in this learning process, where they can learn through concrete tasks the skills and abilities that they can later use in a variety of tasks in their personal and professional lives.

Literature Review

The project has many interpretations. Its history dates back to pre-Christian times. A project is always a series of activities planned to achieve a predefined goal, planned and implemented in a given environment, based on time, cost, resources and outcome criteria (Csiszárik Kocsir et al., 2021). The project method has been known in child education since the beginning of the last century. The school founded by Anna Freud already applied the principle that "children learn best when their interests are fully engaged and they are at the centre" (Young Bruehl, 1988).

Today, the project approach is central to all aspects of life, from the school years to the workplace. When students learn using a project approach, they or a group of students are given or work on a task of their own choosing that matches their interests. The need for a project may be initiated by the task description of the learning structure, but it may also be given by the teacher or even by other groups or group members (Frey, 1982). The nature of project-based learning involves exploring new areas, formulating new scientific questions and integrating knowledge from different disciplines (Barak & Raz, 1998; Barak & Doppelt, 2000). Project-based learning is a well-known method for transferring thinking skills and creating a flexible learning environment (Doppelt, 2003). In general, it is the topics and projects that teachers consider worthwhile and that are of interest to the children involved that are the focus of students' attention (Katz & Chard, 1992).

There is evidence that project-based learning is beneficial for both teachers and students (Thomas, 2010). It is important that education systems should enable students to be more creative, communicative and problem-solving (Kafi & Motallebzadeh, 2014; Noe et al., 2017; Bani Hamad, 2017; Garai Fodor,2022). In order to meet these challenges, schools need to adapt their methods to enable students to learn creative thinking, problem solving and critical thinking. They also need to rethink teaching methods based on collaboration and innovative skills that can be useful in the future labour market and in life (Alismail & McGuire, 2015). According to Barak, the education system in general tends to direct gifted students to extracurricular programmes to help them learn and develop their thinking skills (Barak, 2002).

Students who are given the opportunity to create a prototype are involved in the design, prototyping and evaluation of the process. Through their experiences during the creation process, they understand that much depends on them, which in turn can increase their self-esteem and personal responsibility (Waks, 1995). According to Rogers (1969) and Holt (1965), the school's role is to enable students to satisfy their curiosity, develop their abilities and skills as they wish. According to Lombardi, the 21st century educational curriculum should focus on the construction of knowledge, creating new information for students that stimulates them and that is valuable or meaningful to them. Instructional material should be connected to the real world in a way that supports students' engagement, motivation and understanding of science subjects (Lombardi, 2007). By designing projects, students solve real-world problems by designing their own investigations and learning, and by applying a variety of learning strategies. In the process of learning, learners are motivated and gain valuable skills that will provide them with a strong foundation for their future (Bell, 2010).

Project-based learning puts learners in realistic, contextual problem-solving situations that are directly related to the curriculum and real-life problems. Projects allow learners to bridge classroom and real-life experiences and help them to explore the connections between phenomena. They give meaning to the problems that we encounter in our everyday lives through project-based learning, thus fostering learners' openness to systematic inquiry (Blumenfeld et al, 1991). Ideally, a project involves the acquisition of knowledge and concepts in a wide range of fields, such as science, social science, humanities or even arts.

STEM project-based learning (in science, technology, engineering and maths) is not just about a project that is linked to at least two STEM subject areas, but also includes a constructivist approach to teaching management. The activities allow students to find and define the problem while exploring the project topic (Capraro, 2013). In STEM project-based learning, teachers do not tell students everything; students work collaboratively with their peers to identify problems and develop strategies to solve them (Ozel, 2013). It has been shown that when project-based learning is taught well by teachers, students learn more. However, it has also been found that teachers who do not implement instruction effectively have a negative impact on student achievement (Han et.al, 2015).

It is important to ensure that students in schools learn important aspects of project-based learning, such as the basics of teamwork, communication, collaboration, task sharing and managing deadlines, as soon as possible. It adopts a flexible approach. It adapts to changing circumstances to ensure the success of the project and involves optimising processes to achieve the objective. Time management is also very important in the project approach. Students have to carry out a number of projects in school, it is important to learn how to set deadlines and allocate tasks so that they can be completed efficiently, effectively and on time. The project approach is also

very useful for secondary school students as it helps them to work more efficiently and effectively. If students are properly trained in effective time planning and time management at school, and if they develop their creative thinking and problem solving skills through project work, they will be more confident in the future job market.

Material and Methods

The analysis presented in the paper is the result of a questionnaire survey conducted in 2023, during which a complex, pre-tested, standerdised questionnaire was used to measure the attitudes, digital culture and project approach of secondary school students towards digitalisation processes. The research process involved students from grade 9 to 14, who are studying in vocational education and training. As a result of the survey, 508 questionnaires were returned, of which 427 were fully assessable. In the present study, we assessed the responding students' project approach, their roles in projects, their cooperativeness and their ability to work together from different aspects. The students expressed their opinions on 19 statements related to projects on a four-point scale according to how much they agreed with them. On the scale, a score of 1 indicated total disagreement and a score of 4 indicated total agreement. The composition of the sample is shown in the table below:

Table 1. The composition of the sample

	Frequency	Percent
15 years	80	18,7
16 years	112	26,2
17 years	130	30,4
18 years	73	17,1
19 years	32	7,5

N = 472

Results

In the survey, we asked the students surveyed to examine 19 statements related to projects, teamwork and self-employment. The statements include a mixture of statements related to project roles, working, teamwork, teacher-student roles. The following statements were rated by students using a scale of one to four:

Table 2. Mean values obtained for the statements and their standard deviation

	Mean	Std.dev.
I like a challenges.	3,094	0,696
I like learning through project work.	2,714	0,789
I'm motivated by doing something I haven't done before.	2,799	0,851
When I work on a project, I like to complete the task independently.	2,864	0,891
When I work on a project task, I like to do the task in a collaborative way.	2,881	0,923
When I work on a project task, I expect my tutor or teacher to guide me or help me collaborate on each workflow.	2,883	0,880
I would dive into learning about a technology that I was not familiar with at all.	2,906	0,864
I would be happy to work in a team, in a group, where we have to work together to invent, design, and make systems work, without any prior training (knowledge).	2,862	0,955
Compared to traditional forms of teaching, a project assignment has a particularly strong emphasis on independent student work.	2,923	0,782
In a project task, group work is given a prominent role.		
The time management of projects is very flexible.	2,824	0,772
Project work fundamentally subverts the traditional teacher-student role.	2,290	0,899
I prefer to work on a project topic of my own making.	2,829	0,960
I prefer to work on teacher-generated projects.	2,489	0,897
I prefer to feel insecure when doing a project assignment.	2,302	0,937
When working on a project, I feel more focused on the task at hand.	2,920	0,749
I tend to ask for help when doing a project.	2,583	0,893
I tend to help others when doing a project task.	2,585	0,844
I am persistent when working on a project.	3,122	0,741

N = 472

The figure above shows that the statements asked were rated by the students surveyed with an average value of between 3.122 and 2.290. The survey shows that more than three quarters of the students surveyed can work persistently on a project task, which they can carry out independently and intuitively (3.122). It is also clear that more than three quarters of them like challenges, which is a prerequisite for working on projects. A project always contains a novelty value, new situations to be solved that have never been experienced before. Not shying away from challenges is precisely to strengthen these problem-solving skills and abilities. Students also gave a high average rating for working in a group, with a mean score of 3.068, which is another key element of the project approach. Based on the statements sorted in descending order of mean scores, it can be seen that other important elements of working in a project were described with relatively high scores. It can be seen that working independently is important to students. The statements also show the importance of better focus on tasks, seeking novelty and cooperation. It is also clear that autonomy is not only shown in terms of working independently, but also in terms of coming up with their own project ideas. Students like to manage their own time in order to produce the best possible results. It is also evident that a high percentage of students like project tasks, because there they can show all their skills and knowledge, based on their own time and pace.

Among the statements with the lowest average value, the ones with negative content were the most frequent. Students least agreed that a project assignment would upset the traditional teacher-student role, nor did they agree that a project assignment could make them feel insecure. However, it was clear that they were less keen to work on topics that came from the teacher's side, and more keen to work on their own topics and ideas at their own pace.

Table 1. Correlation of statements on project thinking with the grade of the responding students

		Mean	Std.dev.	F	Sig
I like learning through project work.	9. évf.	2,388	0,921	7,355	0,000
	10. évf.	2,929	0,732		
	11. évf.	2,662	0,721		
	12. évf.	2,699	0,739		
	13. évf.	**3,031**	0,695		
	Total	2,714	0,789		
I am motivated by doing something I have not done before.	9. évf.	2,850	0,943	3,625	0,006
	10. évf.	2,884	0,825		
	11. évf.	2,600	0,784		
	12. évf.	2,808	0,844		
	13. évf.	**3,156**	0,847		
	Total	2,799	0,851		
When I work on a project, I like to complete the task independently.	9. évf.	2,725	0,871	4,215	0,002
	10. évf.	2,857	0,919		
	11. évf.	2,877	0,854		
	12. évf.	2,753	0,925		
	13. évf.	**3,438**	0,716		
	Total	2,864	0,891		
Compared to traditional forms of learning, a project assignment has a particularly strong emphasis on independent learning.	9. évf.	2,813	0,797	2,619	0,035
	10. évf.	2,938	0,763		
	11. évf.	2,846	0,840		
	12. évf.	3,000	0,687		
	13. évf.	**3,281**	0,683		
	Total	2,923	0,782		
The time management of projects is very flexible.	9. évf.	2,700	0,818	3,968	0,004
	10. évf.	2,964	0,657		
	11. évf.	2,662	0,699		
	12. évf.	**2,986**	0,874		
	13. évf.	2,938	0,914		
	Total	2,824	0,772		
When working on a project, I concentrate on the task at hand throughout the collaborative work.	9. évf.	2,800	0,770	2,575	0,037
	10. évf.	2,911	0,766		
	11. évf.	2,885	0,743		
	12. évf.	2,973	0,687		
	13. évf.	**3,281**	0,729		
	Total	2,920	0,749		

We were also curious to know how much belonging to different grades and different ages influenced the perception of certain statements. To this end, we conducted an analysis of variance using Anova's method. It was found that in only six of the 19 statements asked was age, and thus the effect of year group, on its rating observed. From the data in the table, it can be seen that of the statements whose perception was influenced by age and grade, it was clearly the oldest age group that had the highest mean scores. In only one case did we see a different picture, for the statement that related to time management in projects. Here, students in Year 12 agreed most with this statement. It can be seen that the project approach becomes more strongly evident as the grades move upwards. This is also shown by the above-average mean scores for most of the statements in grades 12 and 13.

Conclusion

The results show that the project approach is very important. Although project management education is not specifically and declaratively a compulsory element of secondary education, it is still present in the minds of students. The trend that started years ago, that young people from Generation Z are best employed in projects, has been proven once again. The late Generation Z young people who formed the sample have made clear the importance of a project approach from a practical point of view. It can be stated with absolute certainty that they like to work independently, they like creative tasks where they can solve them themselves, at their own pace. This implies that traditional forms of education must in future be replaced by project-based education, where students can solve problems independently, intuitively and innovatively, learning in a practical way. This is important because it is a huge challenge for the current education system. Curricula need to be adapted to focus on project-based teaching of subjects that develop skills and competences, thus strengthening the project mindset of students, which will clearly enhance their future employability.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Analysis of the Data on School Principals in the TALIS 2018 Country Note Reports in the Context of the PISA 2018 Results

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Abstract: A vast amount of research has been conducted to investigate the effects and roles of educational leaders on school outcomes using data from international studies. To get a better understanding of the relationship between educational leaders and school outcomes, evaluating international studies together may offer more comprehensive suggestions for educational policies. The purpose of this paper was to examine the data on school principals in the TALIS 2018 country note reports in the context of the PISA 2018 results in order to have a broad perspective on the characteristics of school principals as educational leaders. A document analysis was performed on data derived from the TALIS 2018 country note reports of eight OECD countries and Türkiye, and the collected data was subjected to descriptive analysis. At the end of the data analysis, it was revealed that countries that had high success in the PISA results generally had positive values in the TALIS results. It was shown that school principals in the countries ranked high in the PISA have generally more work experience as principals and are more satisfied with their salaries. In addition, their participation in training programs or courses on school management and professional development activities is high. The present study also confirmed previous research, indicating that individuals who have high job satisfaction show high success, thereby ranking high in the PISA results in the context of this study. Our findings indicated that school principals should be encouraged to participate in training to support their professional development.

Keywords: TALIS 2018, PISA 2018, International surveys, OECD countries, School principals

Introduction

In today's competitive world, the importance of education is increasing, and education leads to enhanced productivity and creativity and stimulates entrepreneurship and technological progress. Considering the strong relationship between education and the economy, it is necessary to determine the right education policies for the development of the country. In order to develop education policies and gain experience in their applicability, collaborating with other countries in terms of having knowledge of their education policies and taking an example from their good practices can yield positive results. In this regard, international studies have a significant impact on the sharing of good practices and effective education policies between countries. Hence, besides the academic role of international studies such as The Trends in International Mathematics and Science Study (TIMSS), The Programme for International Student Assessment (PISA), The Teaching and Learning International Survey (TALIS), The Progress in International Reading Literacy Study (PIRLS), The Programme for the International Assessment of Adult Competencies (PIAAC), etc., each of which has its own learning outcome, they also have a decisive role in shaping policies. Moreover, considering the point that international studies emphasize in terms of content, it is seen that the ability to transfer knowledge to the real world comes to the fore in measurement (Cumaoglu & Ozdemir Simsek, 2020). Many conclusions and suggestions for policymakers and educators are made after the student achievements are calculated with the subscales and the scores are created for each subscale. Moreover, countries have the opportunity to see the results of their own

educational programs and policies thanks to the international studies that are held at regular intervals (Sahin & Basgul, 2020), and they also have the opportunity to see their rank among other countries participating in the studies (Celebi et al., 2014). For these reasons, the results of the international studies, which are the education scorecards of countries, are also considered an opportunity to take preventive and improving steps in education policies.

TALIS is a comprehensive survey study that examines the education policies implemented by countries from an international perspective. TALIS aims to identify similar problems faced by countries by asking school principals, and teachers questions about the working conditions and learning environments in their schools (Organization for Economic Co-operation and Development [OECD], 2019d). TALIS, which is one of the international surveys and aims to examine the education policies of countries and their reflections on schools in terms of teachers and school principals, was first implemented in 2008 with the participation of 24 countries. The third cycle and the most recent implementation of TALIS, which is carried out by the OECD with the participation of many countries every five years, was carried out in 2018 with the participation of 48 countries, 30 of which are OECD members. In this cycle, in which many teachers and school principals from primary (International Standard Classification of Education [ISCED] 1), lower secondary (ISCED 2), and high school (ISCED 3) levels participated, data were collected through questionnaires, and the findings were first published by the OECD in 2019 (TEDMEM, 2019). The continuation of the TALIS 2018 results were published in 2020. Thanks to the TALIS studies, which provide a wide-ranging perspective on education with data from different cultures, good practices, deficiencies, and problems in different education systems around the world have the opportunity to be examined.

Another survey study developed by the OECD and applied internationally is PISA. PISA, which was first implemented in 2000, is a survey study that evaluates every three years to what extent 15-year-old students worldwide have acquired the basic knowledge and skills necessary for full participation in social and economic life (OECD, 2019c). PISA assesses students' reading skills and literacy in mathematics and science, which are three main areas, and measures their performance in these areas. In each PISA cycle, the main focus is determined, and detailed analyses are made regarding that area. Also measured in PISA is how well students can make inferences from the knowledge they have learned before and to what extent they can apply this knowledge to new situations inside and outside the school. A large number of students from 79 countries, 37 of which are OECD member countries and 42 of which are partner countries, participated in PISA 2018, in which the domain of reading skills was determined as the main focus (OECD, 2019a). Hence, the correct interpretation of PISA results, which provide data about different school climates as well as three main areas, can be a useful tool for increasing student achievement and education policies.

In addition to its studies on the achievement and social-emotional skills of students, the OECD, which defines policies related to school practices and the quality of the education system, tries to find answers on how teachers and schools can contribute to student success. Thus, a complete view of what is happening in today's schools is obtained by evaluating two survey studies together that complement each other, such as PISA and TALIS, which are two pieces of the puzzle. (OECD, 2021). With the evaluation of TALIS and PISA results together, the link created between the two ensures better production of both data quality and policies (OECD, 2015). This link also provides valuable information about teaching strategies and their relationship with school climate, student outcomes, and classroom environments. Therefore, a better comprehension of the relationship between TALIS and PISA helps teachers, schools, and educational policymakers design more effective policies to increase learning achievements (Le Donné et al., 2016). In accordance with this purpose, some questions about the teaching profession and teacher self-efficacy in the TALIS cycle conducted in 2013 were also included in the PISA 2015 optional teacher questionnaire (OECD, 2015). Hence, more comprehensive analyses were made by using the same variables in both studies. Similarly, common questions on the themes of job satisfaction, self-efficacy, school climate, and teacher training were included in the TALIS 2018 and the PISA 2018 (TEDMEM, 2019). Thus, the same themes were evaluated in terms of different contexts created by different studies and discussed from a broad perspective.

School management plays a key role in school development and the quality of education (Bolívar Botía & Bolívar Ruano, 2011). Therefore, it is crucial to understand the importance of the school principal for educational success. The literature review presents the broad results of national and international studies covering the training process of school administrators and the standards and qualifications that should be possessed by school administrators (Aslan & Karip, 2014; Bakkal & Radmard, 2020; Schleicher, 2012; Turan & Sisman, 2000; Young et al., 2017). In this regard, the educational leadership standards set forth by The Interstate School Leaders Licensure Consortium (ISLLC) are one of the most prominent studies (Aras, 2020). It is seen that school development and education quality, in which school management plays a vital role, are also related

to the mission, vision, and basic values included in the 2015 educational leadership standards. Thus, it is indispensable for school administrators to fulfill their responsibilities and exhibit appropriate managerial behaviors in order for the school to achieve its purpose, be successful, and provide quality education (Kurun & Cobanoglu, 2019). Considering the duties and responsibilities of school administrators, in addition to their managerial behaviors, they must also exhibit successful educational leadership behaviors to reach the predetermined goals of the school and be effective in improving the achievement of students (Oztas, 2010). Moreover, there are many decisions that education leaders have to make in the process of achieving this aim. Decision-making is one of the most basic responsibilities of a principal, but it is also a criterion of competence for the principal (Uras, 1995). Studies have revealed that when school leaders are given autonomy in making important decisions, they can make a difference in student performance and schools, and this can be achieved by influencing teachers' motivation, commitment, capacity, school climate, and environment (Pont et al., 2008). While this shows the importance of the leadership behaviors of autonomous school principals in decision-making for school success and education quality, it also emphasizes the leadership behaviors of school principals. In this context, Gümüs and Bellibas (2015), who drew attention to the positive relationship between school principals who exhibit successful leadership behavior and effective schools, stated that leadership training has gained importance for school principals. Accordingly, school principals being well-trained and constantly improving are of great importance in terms of educational outcomes. In this study, the data on school principals in the TALIS 2018 country note reports is discussed within the scope of the PISA 2018 results.

Purpose of the Study

The main purpose of this research is to examine the data on school principals in the TALIS 2018 country note reports in the context of the PISA 2018 results. Therefore, the data on school principals in the TALIS 2018 country note reports were evaluated together with the results of the PISA 2018. This research is important in terms of considering the results of the TALIS 2018 together with the results of the PISA, which are both international large-scale studies. Although there are many studies on TALIS and PISA results in the literature, there are not enough studies evaluating TALIS and PISA results together. The findings of this study are important, as it is thought that they will contribute to the professional development of school principals in Türkiye and will help researchers who will work in this field.

The Rresearch Question

The overarching research question of this study is as follows:

- How are the TALIS 2018 results for school principals in the first 8 OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results?

The sub-questions created in line with this research question are as follows:

- How are the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results in terms of
  - Gender distribution of school principals
  - Age of school principals
  - School principals' years of work experience (as a principal)
  - Pre-service training of school principals
  - Participation of school principals in in-service training
  - School principals' satisfaction with their job and the terms of their contract (apart from salary)
  - School principals' satisfaction with their salaries,
  - The autonomy of the schools over determining salary increases or bonuses for teachers based on principals' responses
  - Views of school principals and teachers about collegiality and collaboration in school tasks
  - The three most prevalent sources of stress for school principals

Method

This study was carried out within the scope of the "document analysis" design, which is one of the qualitative research designs. Qualitative research aims to examine the problem situation of the research by interpreting it

from a holistic perspective that includes different disciplines (Karatas, 2015). Qualitative researchers aim to "borrow ideas from the people they study and place them within the context of a natural setting" (Neuman, 2007, p. 89).

According to the PISA 2018 results, the top 8 countries that are above the OECD average in all three areas and show high success are, respectively: Estonia, Canada, Finland, Ireland, Korea, Poland, Sweden, and New Zealand. Since the TALIS 2018 country note reports of Ireland and Poland could not be reached, these two countries were excluded, and the other two countries that were above the OECD average in all three areas according to the PISA 2018 results were included, respectively. At the end of this process, the eight countries that emerged and were discussed in this study are, respectively; Estonia, Canada, Finland, Korea, Sweden, New Zealand, the United Kingdom, and Japan.

The reports that are used as research documents were accessed from the OECD's related website: https://www.oecd.org/education/talis/talis-2018-country-notes.htm. Within the scope of the study, the reports of eight OECD countries and Türkiye were examined on this website, which includes the results of 49 countries. In addition, it was seen that only the province of Alberta was taken into account in Canada's TALIS 2018 country note reports and only England in the UK's TALIS 2018 country note reports after examinations were made. Hence, the findings about Canada in this study are only for the province of Alberta, and the findings about the United Kingdom are only for England.

Research Documents

The documents of this research are the TALIS 2018 country note reports of 8 OECD countries and Türkiye, which were created by taking into account the PISA 2018 success ranking generated based on the mean scores of countries. The countries whose TALIS 2018 country note reports were examined as part of the research document are shown in Table 1, titled "OECD country means based on the results of PISA 2018". Moreover, since the main subject assessed in PISA 2018 is "reading", this ranking was adapted by considering the reading means.

Table 1. OECD country means based on the results of PISA 2018

Countries	Reading Mean	Mathematic Mean	Science Mean
Estonia	523	523	530
Canada	520	512	518
Finland	520	507	522
Korea	514	526	519
Sweden	506	502	499
New Zealand	506	494	508
United Kingdom	504	502	505
Japan	504	527	529
OECD Average	487	489	489
Türkiye	466	454	468

Note. Adapted from "PISA 2018 Results" by OECD (2019b, p.17)

Data Collection and Analysis

In this study, document analysis was used as a data collection method. Karatas (2015) defined document analysis as a systematic analysis method that examines written documents related to the research topic. Document analysis "provides the systematization of the researcher's observation, interview records, and other documents" (Baltacı, 2019). Bowen (2009), who states that document analysis has some disadvantages as well as advantages, lists availability, cost-effectiveness, and exactness as some advantages of document analysis; also mentions biased selectivity and low retrievability as some of its disadvantages.

The document analysis stages developed by Forster (1995) are as follows; accessing the document, checking the originality, understanding the document, analyzing the data and using the data (as cited in Yıldırım & Simsek, 2018). At the stage of accessing the document, the country note reports that are the documents of this research were accessed from the website of the OECD (https://www.oecd.org/education/talis/talis-2018-country-notes.htm). At the stage of checking originality, it has been seen that documents (reports) are original as they

have been downloaded from the official site of the organization as published. At the stage of understanding the document, the relevant country reports were examined in detail and within a certain system. At the stage of analyzing the data, descriptive analysis was applied to analyze the research documents. For descriptive analysis, the data were processed based on a predetermined framework, and the findings were interpreted. In this context, descriptive analysis was used to analyze data on the school principal's gender distribution, age, years of work experience (as a principal), training received on school management and instructional leadership, participation in professional development activities, satisfaction with the job and contract (apart from salary), satisfaction with the salary, views about the autonomy of schools over determining teachers' salary increases or bonuses, and teachers' views about collegiality and collaboration and the three most prevalent sources of stress. Finally, at the stage of using the data, the analysis was interpreted with suitable explanations. While interpreting the findings, the literature was also used, and the findings were supported with meaningful and consistent explanations from the literature.

While using various techniques to ensure the validity and reliability of the study, attention was paid to the analysis of the evaluated country note reports based on consensus and reporting in detail. Also, expert review and peer confirmation were used to ensure the internal validity (credibility) of the data. The processes carried out in this process are described in detail. Thus, external validity (transferability) was tried to be ensured. In this context, the model of the research, the research documents, the data collection, the analysis of the data, and how the findings were organized were explained in detail. Moreover, in order to increase the internal reliability (consistency) of the research, the findings were given directly. The raw data of the research were kept in consideration of the requests that may come from other researchers regarding the study data. Hence, external reliability (confirmability) was tried to be increased. In addition, document reliability was also ensured by choosing the country note reports of the OECD as a data source, which is the institution that has 38 member countries and intercontinental initiatives and reaches the most comprehensive systematic data on a wide range of subjects such as economy, health, education, etc. and shares their data with decision-making authorities.

Results and Discussion

Data obtained from the research documents was analyzed. The results are as follows:

Gender distribution of school principals in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

The gender distribution of school principals was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "Gender distribution of school principals".

Table 2. Gender distribution of school principals

Countries	Percentage of female principals	Percentage of male principals
Estonia	57	43
Canada	30	70
Finland	46	54
Korea	20	80
Sweden	69	31
New Zealand	54	46
United Kingdom	41	59
Japan	7	93
Türkiye	7	93
OECD Average	47	53

In Table 2, showing the female-male percentage of school principals in the first 8 OECD countries in the PISA 2018 results and Türkiye; it is seen that Estonia, Sweden and New Zealand are above the OECD average in terms of female school principals. As for Türkiye, it has been found that the percentage of female school principals is 7%, which is well below the OECD average (47%). In addition, the country with the highest percentage of female school principals is Sweden with 69%, while the countries with the lowest percentage of female school principals are Japan and Türkiye with 7%. When Table 2 is analyzed together with the PISA 2018 ranking, it has been observed that the percentage of male school principals in the top countries in the PISA ranking is also above the OECD average, mostly. In addition, the fact that Türkiye and Japan have the same

percentage was found to be a significant result, and it was also considered a subject to be investigated. Also, Sweden has the highest percentage of female school principals (69%) among the countries examined. In addition, the low percentage of female school principals even in developed countries, which are at the top in the PISA 2018 results, is an indicator of the continued absence of women in the business world in a global sense.

Age of school principals in the first eight OECD countries that show high success in all three areas and Türkiye in the PISA 2018 results

The age of school principals was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "Age of school principals".

Table 3. Age of school principals

Countries	Avarage age of principals	Percentage of principals age 60 and above
Estonia	53	21
Canada	51	19
Finland	50	10
Korea	59	44
Sweden	52	24
New Zealand	52	14
United Kingdom	50	6
Japan	58	22
Türkiye	43	7
OECD Average	52	20

As seen in Table 3, the average age of school principals in Canada, Finland, the United Kingdom and Türkiye is below the OECD average (52 years old), while the school principals of Sweden and New Zealand have the same average age as the OECD average. When the percentage of principals age 60 and above was examined, the percentages of Estonia, Korea, Sweden and Japan were found to be above the OECD average. On the other hand, Türkiye is below the OECD average both in the average age of school principals and in the percentage of principals aged 60 and above. Table 3 shows that the average age of school principals in the top ranked countries in the PISA results is generally high. Like OECD countries that show high success in PISA, Gajda and Militello (2008) said that the average age of school principals in Massachusetts is increasing. Therefore, it was concluded that there could be a relationship between the age of school principals and school success.

School principals' years of work experience (as a principal) in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

School principals' years of work experience (as a principal) were examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "School principals' years of work experience (as a principal)".

Table 4. School principals' years of work experience (as a principal)

Countries	Principals' years of work experience (as a principal)
Estonia	10-15
Canada	10-15
Finland	10-15
Korea	0-5
Sweden	5-10
New Zealand	5-10
United Kingdom	5-10
Japan	0-5
Türkiye	5-10
OECD Average	10

Table 4 shows that the work experience of school principals in Estonia, Canada and Finland is above the OECD average (10 years). Also, it was seen that school principals have the least work experience as principals in Korea

and Japan (0–5 years). As for Türkiye, the work experience of school principals is 5–10 years, which is below the OECD. When the results are evaluated considering the PISA 2018 ranking, it has been observed that the work experience of school principals in the countries at the top of the PISA ranking is generally high and above the OECD average. In other words, countries where school principals have more work experience rank highly in the PISA. When the results of the school principals' age and work experience as principals obtained from this study are evaluated together, it can be concluded that the contribution of experienced school principals to school success by sharing their experiences with other staff is reflected in the PISA 2018 results. This finding supports the results of Clark et al. (2009) that higher school performance is associated with experienced school principals.

Pre-service training of school principals in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

Pre-service training of school principals was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "Pre-service training of school principals".

Table 5. Pre-service training of school principals

Countries	Percentage of principals who have received a training programme or course on school management before taking up their position as principal	Percentage of principals who have received a training programme or course on instructional leadership before taking up their position as principal
Estonia	59	60
Canada	56	48
Finland	88	48
Korea	82	94
Sweden	44	54
New Zealand	42	44
United Kingdom	64	57
Japan	54	71
Türkiye	30	36
OECD Average	54	54

In Table 5, showing the training of school principals before taking up their position as principal, it has been observed that the percentage of school principals who have received a training program or course on school management in Sweden, New Zealand and Türkiye is below the OECD average (54%). When it is evaluated in terms of school principals who have received a training program or course on instructional leadership, it is seen that Canada, Finland, New Zealand and Türkiye are below the OECD average (54%). While the country with the highest percentage in terms of school principals who have received a training program or course on school management is Finland with 88%, the country with the lowest percentage is Türkiye with 30%. When it comes to the percentage of principals who have received a training programme or course on instructional leadership, while Korea has the highest percentage with 94%, Türkiye has the lowest percentage with 36%. It has been observed that Türkiye has the lowest percentage and is well below the OECD average in both fields of training. When Table 5 is analyzed with the PISA 2018 ranking, it has been revealed that countries with a high percentage of school principals who have received pre-service training on school management or instructional leadership are generally at the top of the PISA rankings. Moreover, it was found as a significant result that New Zealand has a low percentage in both fields of pre-service training, although it ranks high in the PISA 2018 results, and that has also been identified as a subject to be investigated. Regarding the training completed by school principals, Recepoglu and Kılınc (2014) said that a postgraduate education obligation should be introduced for school principals. It may be said that thanks to the training school principals get, it is easier to exhibit successful leadership behavior.

Participation of school principals in in-service training in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

Participation of school principals in in-service training was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA

2018 results. The relevant data are presented in the table titled "Participation of school principals in in-service training".

Table 6. Participation of school principals in in-service training

Countries	Percentage of principals attending at least one professional development activity in the year prior to the survey
Estonia	100
Canada	99
Finland	99
Korea	99
Sweden	100
New Zealand	100
United Kingdom	99
Japan	99
Türkiye	96
OECD Average	99

As seen in Table 6, only Türkiye was below the OECD average (99%) with 96%, while all other countries on the list were above the OECD average. Moreover, the fact that Estonia, Sweden and New Zealand had 100% attendance at at least one professional development activity in the year prior to the survey was also found to be a significant result in terms of getting full points. When Table 6 is analyzed with the PISA ranking, it is revealed that the top ranked countries have high participation in in-service training. It means that countries that have high PISA 2018 rankings give more importance to professional development activities, and their participation in such activities is also high. Regarding the findings about the positive relationship between the participation of school principals in in-service training and the PISA 2018 results, in the study of Ozcan and Bakioglu (2010), it was revealed that in-service training improved school principals, but the level of development achieved was very low. On this subject, Chapman (2005) stated that schools need experienced school principals in order for the school and leadership practices in the school to be successful and emphasized experience.

School principals' satisfaction with their job and the terms of their contract (apart from salary) in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

School principals' satisfaction with their job and the terms of their contract (apart from salary) was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "School principals' satisfaction with their job and the terms of their contract (apart from salary)".

Table 7**.** School principals' satisfaction with their job and the terms of their contract (apart from salary)

Countries	Percentage of school principals who are satisfied with their job	Percentage of school principals who are satisfied with the the terms of their contract (apart from salary)
Estonia	94	88
Canada	99	80
Finland	92	64
Korea	96	62
Sweden	93	70
New Zealand	94	74
United Kingdom	93	82
Japan	93	48
Türkiye	83	34
OECD Average	95	66

Looking at Table 7, it has been seen that in terms of school principals who are satisfied with their job, the country with the highest percentage is Canada with 99%, and the lowest is Türkiye with 83%. In terms of school principals who are satisfied with the terms of their contract (apart from salary), the country with the highest percentage is Estonia with 88%, and the country with the lowest percentage is Türkiye with 34%. Türkiye is below the OECD average both in the percentage of school principals who are satisfied with their job and in the percentage of school principals who are satisfied with the terms of their contract (apart from salary). When these results are evaluated with the PISA 2018 ranking, it has been concluded that the countries that rank high in the

PISA ranking have high percentages in both satisfaction areas generally. When the findings of job satisfaction were compared with the age of school principals and the PISA 2018 results, it was found that the job satisfaction of experienced school principals was also high. A similar result was expressed in the study of Demirtas and Alanoglu (2015), and it has been revealed that there is a linear and positive relationship between age and job satisfaction level, and age is an important predictor of job satisfaction.

School principals' satisfaction with their salaries in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018

School principals' satisfaction with their salaries was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "School principals' satisfaction with their salaries".

Table 8. School principals' satisfaction with their salaries

Countries	Percentage of school principals who satisfied with their salaries
Estonia	44
Canada	61
Finland	67
Korea	59
Sweden	49
New Zealand	36
United Kingdom	81
Japan	29
Türkiye	52
OECD Average	47

In Table 8, showing the satisfaction of school principals with their salaries, it is seen that the percentage of school principals who are satisfied with their salaries in Estonia, New Zealand and Japan is below the OECD average (47%). The country with the highest percentage of satisfaction with salaries is the United Kingdom with 81%, while the country with the lowest is Japan with 29%. Türkiye, on the other hand, has a percentage above the OECD average of 52%. When Table 8 is analyzed with the PISA 2018 ranking, it is concluded that the percentage of school principals satisfied with their salaries in the top-ranked countries is high and generally above the OECD average. However, it has emerged as a significant result that the percentage of school principals who are satisfied with their salaries in New Zealand and Japan is far from the OECD average, which ranks high in the PISA 2018 rankings. This has been identified as a subject to be investigated. As for the positive relationship between satisfaction with job, salary, and the PISA 2018 results, it is an expected result that individuals become more motivated as their internal satisfaction with the work done and the employment contract, which includes their salary and personal rights, increases. As a result of the increased motivation, an increase in success may be observed both at the individual and organizational levels. Similarly, in the study conducted by Telman and Ünsal in 2004, it was revealed that individuals with high job satisfaction experienced high success (Basbekleyen, 2019). It is inevitable that the success of the organization will increase as a consequence of the more determined and enthusiastic work of individuals who are satisfied with their jobs. Moreover, making salary improvements for the job satisfaction of school principals by considering the level and physical structure of the school may make them more motivated towards work. Savas (2019) stated that the level and size of the school can also be considered instead of evaluating the salaries of school principals with the same standards.

The autonomy of the schools over determining salary increases or bonuses for teachers based on principals' responses in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

The autonomy of the schools over determining salary increases or bonuses for teachers based on principals' responses was examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "The autonomy of the schools over determining salary increases or bonuses for teachers".

Table 9. The autonomy of the schools over determining salary increases or bonuses for teachers

Countries	Percentage of schools have autonomy over determining salary increases or bonuses for teachers based on principals' responses
Estonia	49
Canada	50
Finland	13
Korea	7
Sweden	81
New Zealand	43
United Kingdom	77
Japan	11
Türkiye	8
OECD Average	32

Table 9 revealed that Finland, Korea, Japan and Türkiye have a percentage well below the OECD average (32%). Based on school principals' responses, the country with the highest percentage of school autonomy over determining salary increases or bonuses for teachers is Sweden with 81%, while the country with the lowest is Korea with 7%. Turkiye, on the other hand, has a percentage of 8%, which is below the OECD average. When Table 9 is evaluated with PISA 2018 results, based on the school principals responses, schools autonomy over determining salary increases or bonuses for teachers is generally higher in the countries ranked high. In other words, the impact of schools on teacher salaries or bonuses is also higher in countries at the top of the PISA 2018 ranking. Although Finland and Korea rank high in the PISA 2018 results, the low percentage of schools' autonomy over determining salary increases or bonuses for teachers emerged as a significant result and has been determined as a subject to be investigated further. Also, salary, which is a hygiene factor according to Herzberg theory, emerged as a strong motivation source in Gawel's (1996) study and was expressed as a strong motivation factor for all teachers who participated in the study. It may be said that salary is a strong motivation source for teachers as well as school principals, and it strengthens the importance of the school on teacher salaries. Therefore, making improvements in teachers' salaries and giving performance related bonus wages may be beneficial in terms of school success.

Views of school principals and teachers about collegiality and collaboration in school tasks in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

Views of school principals and teachers about collegiality and collaboration in school tasks were examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "Views of school principals and teachers about collegiality and collaboration in school tasks".

Table 10.Views of school principals and teachers about collegiality and collaboration in school tasks

Countries	Percentage of principals who report that teacher have significant responsibility for the majority of tasks concerning school policies, instruction and curriculum	Percentage of teachers who "agree" or "strongly agree" that their school provides staff with opportunities to actively participate in school decisions
Estonia	83	87
Canada	21	81
Finland	55	77
Korea	26	76
Sweden	30	79
New Zealand	41	73
United Kingdom	47	63
Japan	11	77
Türkiye	4	78
OECD Average	42	77

As seen in Table 10, the country with the highest percentage of school principals who report that teachers have significant responsibility for the majority of tasks concerning school policies, instruction and curriculum is Estonia with 83%, while the country with the lowest is Türkiye with 4%. The country with the highest percentage of teachers who 'agree' or 'strongly agree' that their school provides staff with opportunities to actively participate in school decisions is Estonia with 87%, while the country with the lowest is the United

Kingdom with 63%. Also, it has been observed that there are great differences between the answers given by school principals and teachers in Türkiye, Canada, Korea, Sweden and Japan. While the majority of teachers think that their school provides staff with opportunities to be actively involved in the decision-making process in school, only a few of the school principals report that teachers have significant responsibility for the majority of tasks concerning school policies, instruction and curriculum. For this reason, the results of Canada, Korea, Sweden and Japan as well as Türkiye display that more research needs to be conducted. According to Ronald Barth (2001), it is important for the organizational health of the school to show the teachers' leadership behaviors and to take decisions on many issues about students, teachers, course materials, curriculum, etc. It may also be said that the participation of teachers in decisions about the school is important for the integrity and consistency of the system. The fact that school principals in most of the countries that are in the top ranks in PISA 2018 think that teachers do not have significant responsibility for the majority of tasks is another surprising result of this research.

The three most prevalent sources of stress for school principals in the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results

The three most prevalent sources of stress for school principals were examined in detail in the TALIS 2018 country note reports of the first eight OECD countries, which show high success in all three areas, and Türkiye in the PISA 2018 results. The relevant data are presented in the table titled "The three most prevalent sources of stress for school principals".

Table 11. The three most prevalent sources of stress for school principals

Countries	Having too much administrative work to do	Accommodating students with special needs	Keeping up with changing requirements from local, municipal/regional, state or national/federal authorities	Being held responsible for students' achievement	Addressing parent or guardian concerns	Having extra duties due to absent school staff	Maintaining school discipline
Estonia	+	+	+				
Canada	+			+	+		
Finland	+		+			+	
Korea	+			+			+
Sweden	+	+				+	
New Zealand	+		+		+		
United Kingdom	+		+	+			
Japan	+			+	+		
Türkiye	+			+			+

When Table 11 was examined, it was seen that "having too much administrative work to do" is common in all countries. By taking into consideration the results of PISA 2018, it could be thought that school principals have too much administrative work in the first 8 OECD countries and Türkiye, and this creates a lot of trouble for them in terms of the source of stress. It is seen that " accommodating students with special needs", " having extra duties due to absent school staff " and "maintaining school discipline" were the least mentioned sources of stress by school principals. Looking at the data of Korea and Türkiye, it was found that all three sources of stress are common in these countries, which are " having too much administrative work to do", " being held responsible for students' achievement " and "maintaining school discipline". As for Canada and Japan, "having too much administrative work to do", "being held responsible for students' achievement" and "Addressing parent or guardian concerns" are the three common sources of stress in these countries. When Table 11 was evaluated with the PISA 2018 results, it was found as an impressive result that school principals in Korea, which is one of the top countries in the PISA 2018 ranking, and Türkiye which is at the bottom, have the same stressors. Similarly, school principals in Canada and Japan have the same stressors. It has been determined that this situation is a subject that needs to be investigated further. "having too much administrative work to do" may cause disruptions in areas such as in-school communication, family and school interaction, student success, the social duty of the school, and also individually. As a parallel to this finding, in the study of Beycioglu et al.

(2018), it was revealed that as school principals postpone many tasks due to workload, this situation causes disruptions in other works at school, and at the same time, they experience a loss of confidence and power towards teachers, students, and parents, who are the components of the school. Accordingly, our finding supports the idea that increasing work efficiency and effectiveness by reducing administrative workload that prevents other responsibilities of school principals may contribute to both school principals and school success.

Conclusion

In this study, researchers have focused on the analysis of the data on school principals in the TALIS 2018 country note reports in the context of the PISA 2018 results to gain a broad perspective on the characteristics of school principals as educational leaders. According to the findings, it was concluded that countries that have high success in PISA results generally have positive values in TALIS results. It was shown that the percentage of female school principals even in developed countries is low, and this emerged as an indicator of the continuing absence of women in the business world in a global sense. Moreover, it was observed that the contribution of experienced school principals to school success by sharing their experiences with other staff was reflected in the PISA 2018 results. The present study also shows that school principals have too much administrative work to do is one of the three most prevalent sources of stress related to education and shared in all countries studied.

Recommendations

This study is limited to the TALIS 2018 and PISA 2018 data. A more comprehensive interpretation may be achieved by including data from different years and more countries in the study. Available knowledge about school principals based on the results of TALIS and PISA can also be enriched through comparative studies covering more countries and involving large groups. In addition to these studies, by conducting a survey study with school principals in the countries included in the research, it may be seen if there are changes in the countries over the time elapsed through the TALIS and PISA results of 2018, and if so, in what direction. Furthermore, we recommend carrying out a more explanatory study by conducting research on the reasons for the findings obtained. Considering the research findings about countries like Türkiye, which are in the lower ranks in PISA 2018, it is obvious that experienced school principals are needed, and their participation in pre-service and in-service training should be encouraged. In this way, the effect of the leadership skills of school principals on education in these countries may be more prominent in addition to the improvements that may occur in the PISA results regarding the mission, vision, and core values, which are among the educational leadership standards.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Can Environmental Education Supported by Augmented Reality (AR) Applications Improve the Environmental Awareness of Primary School Students?

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Abstract: It is thought that it would be appropriate to use augmented reality technology, which provides many educational advantages for effective environmental education. This research aims to examine the effect of environmental education using augmented reality (AR) applications on the knowledge, attitudes, and behaviors of primary school third-grade students towards the environment and to find out the children's views on AR. The case study design, one of the qualitative research methods, was used in the research. The research was carried out with seventeen primary school third-grade students from a public school in the 2021-2022 academic year. Environmental education was given to the selected class with augmented reality applications for six weeks. The data were collected with the 'Semi-Structured Interview Form' prepared by the researcher. Content analysis technique was used in the analysis of the data. According to the findings obtained from the interviews; it has been concluded that environmental education using AR applications is effective in the knowledge, attitude, behavior, and environmental awareness of third-grade students towards the environment. In addition to these, in the interviews; it has been determined that students have positive emotions towards AR reality applications; they want to use the applications in other lessons; AR applications facilitate their learning and positively affect their approaches towards living / non-living beings, the environment and environmental problems.

Keywords: Augmented reality, Environmental awareness, Environmental knowledge, Environmental attitude, Environmental behavior

Introduction

The environment is the habitat where living and non-living elements directly or indirectly affect humans (Erman, 2013). Just as the environment affects humans, humans also influence the environment. This interaction between the environment and humankind has been progressing healthily for centuries, but it started to deteriorate, particularly with industrialization and technological advancements. According to Akın (2009), major human-induced environmental pollution did not occur until the Industrial Revolution. However, with the Industrial Revolution, the rapid increase in industrialization and population led to an increased demand for raw materials and the reckless consumption of natural resources at the same rate.

Unplanned urbanization destroyed natural habitats and put many species at risk, while air, water, and soil pollution started to emerge. In other words, the balance between humans and the environment was disrupted after the Industrial Revolution, and significant environmental problems began to arise. These problems include pollution observed in fundamental elements of the environment such as air, water, and soil, as well as light, noise, electromagnetic, and radioactive pollution, and the possible effects of these problems such as global warming, climate change, the greenhouse effect, ozone depletion, acid rain, and a decrease in biodiversity

(Çavuş Güngören, 2022). When examining the causes of these problems, it is mostly seen that they stem from human impact. Karakaya (2016) states that environmental problems arise from individual and collective human activities. Therefore, to overcome existing problems and potential future problems, it is necessary to start with the humans who are the source of the problem. After all, the source of the problem is the solution itself. According to Ergin (2013), the effectiveness of measures taken against environmental problems can be achieved through the existence of citizens who have environmental awareness. Individuals who have a good understanding of the environment, display a positive attitude towards it, and behave responsibly – in other words, individuals who have environmental awareness – are the most important source of solutions that can stop the deterioration of the environment and turn it into a positive direction.

As the increase in environmental problems became a global threat, particularly in the last 50-60 years, national and international focus on this issue has started to intensify. In national and international events such as congresses, symposiums, and panels, environmental education has emerged as the most important topic for solving environmental problems, leading governments to integrate environmental education into their educational systems. This is because individuals are at the center of environmental problems, and education has been recognized as the most effective way to develop long-lasting behaviors that align with desired environmental outcomes. Environmental education aims to cultivate individuals with environmental awareness. The goals of environmental awareness include environmental knowledge, positive attitudes toward the environment, and environmentally beneficial behaviors (Erten, 2005). In other words, the purpose of environmental education is to cultivate individuals who have the necessary knowledge about the environment, display positive attitudes toward the environment, and demonstrate beneficial behaviors towards the environment. Environmental awareness consists of three sub-dimensions.

Environmental knowledge refers to the level of knowledge regarding the elements of the environment, global issues, types of environmental pollution, and the preservation of the existing biosystem (Yıldırım, 2019). Environmental attitudes encompass individuals' positive or negative attitudes and thoughts towards environmentally beneficial behaviors, including fears, anger, restlessness, value judgments, and readiness to contribute to solving environmental problems (Erten, 2004). Environmentally friendly behavior is defined as the ability to take action for the conservation of the environment and the solution of environmental problems, as well as translating environmental knowledge and positive attitudes towards the environment into actions (Candan, 2015). Instilling environmentally friendly behavior is the most important criterion of environmental education (Arslan, 2022). According to Erten (2004), even if someone possesses all the knowledge about the environment, it is meaningless if they do not display environmentally friendly behaviors. The crucial issue here is the transformation of environmental knowledge and attitudes towards environmentally friendly behaviors.

To overcome environmental problems, there is a need for a tool that aims to cultivate individuals with environmental awareness, and this tool is environmental education (Erten, 2012). Environmental education is the development of environmental awareness in all sections of society, aiming to create sensitivity towards the environment and instill lasting and positive behavioral changes (Eroğlu & Keleş, 2009). According to Güven (2013), effective, planned, and goal-oriented environmental education is needed to cultivate individuals with knowledge and awareness of environmental problems. As a result of environmental education, individuals in society will perceive themselves as part of the solution rather than part of the problem, and many problems can be overcome by increasing environmental sensitivity (Karataş & Karabağ, 2013). According to Park, Boo, and Park (2022), environmental education not only involves providing students with information about the environment but also influences their attitudes and behaviors towards the environment. The primary objectives of environmental education, according to Gülay and Öznacar (2010), are to develop correct attitudes, behaviors, and skills related to the environment, make individuals environmentally literate, and increase awareness and sensitivity towards the environment.

Providing environmental education to children at an early age is crucial in solving environmental problems and preventing the emergence of new ones (Dilli, Bapoğlu Dümenci, & Turgut Kesebir, 2018; Atabek Yiğit, Balkan Kıyıcı, & Yavuz Topaloğlu, 2019). According to Liefander and Bogner (2014), environmental education can be more effective in young children, and its effectiveness decreases as age advances, making it more challenging to implement. Additionally, environmental education is a lifelong process, and it needs to start at an early age to build a strong foundation. Considering that education begins in the family, environmental education also begins in childhood within the family. However, not every individual may have family members with sufficient knowledge and environmental awareness. This means that individuals may not receive equal levels of environmental education in their families and may not develop an environmental consciousness. This is where schools come into play. According to Mustam and Daniel (2016), formal environmental education provided in schools is more likely to lead to environmentally friendly behaviors.

The most crucial formation for the development of environmentally conscious societies takes place in primary school years (Çelikler, Aksan, & Yenikalaycı, 2017). However, there are also limitations to primary education in terms of environmental education. In Turkey, there is no separate subject dedicated to the environment in primary schools. Environmental topics are predominantly covered within the curriculum of science lessons. The abstract nature of environmental concepts poses limitations for elementary school children who are in the concrete operational stage cognitively. Moreover, the traditional methods used in teaching negatively affect students' attention and motivation. In environmental education, out-of-school learning environments or nature experiences are vital (Bögeholz, 2006; Özdemir, 2010; Okur, 2012; Sarışan Tungaç, 2015). However, there are disadvantages to out-of-school learning environments, such as transportation difficulties, financial constraints, overcrowded classes and challenging control, potential hazards, time constraints, and difficulties in covering all the topics (Kubat, 2018; Ocak & Korkmaz, 2018). In addition to these limitations, there are also certain requirements for effective environmental education.

Environmental education increases students' environmental knowledge and awareness when it is provided in a visual, auditory, and practical way in early childhood (Tahiroğlu, Yıldırım, and Çetin, 2010). In environmental education, active teaching processes such as establishing the relationship between what is learned and life, meeting individual needs, and providing motivation must be taken into account. This can be possible by emphasizing a constructivist learning approach and innovative learning situations that will provide students with active participation in environmental education (Özdemir, 2007). In addition, it may not be possible to reach many topics related to the environment. According to Özdemir and Uzun (2006), to provide effective learning, it is necessary to either implement educational situations in the outside world or to bring the outside world to the educational environment. Against all these negativities, limitations, and requirements, it is necessary to use modern teaching technologies/materials that will enrich the educational environment and increase attention and motivation to the highest level.

In line with the developing technology, one of the technologies used in educational environments, especially in recent times, is augmented reality. Augmented reality (AR) is a technology in which real and virtual objects coexist simultaneously (Matcha and Rambli, 2013). With augmented reality technology, virtual objects can be displayed with glasses or mobile devices such as phones and tablets by integrating them into the real environment and interaction with these objects can be provided. Augmented reality technology has many educational benefits, such as increasing student success and motivation (Budiman, 2016; Saez Lopez et al., 2019; Iatsyshyn et al., 2019; Dikkartin Övez and Sezginsoy Şeker, 2022), providing a sense of reality (Carmigniani et al., 2011; Küçük, Kapakin, and Göktaş, 2015), providing experiences that are not possible in real life (Wu et al., 2013; Garzon, Pavon, and Baldiris, 2019; Seçkin Kapucu and Yıldırım, 2019; Khan, 2019; Eginli and Nacaklı, 2020), addressing all senses (Craig, 2013), making abstract concepts concrete (Arıcı, Yılmaz, and Yılmaz, 2021; Faridi, 2020), providing learning by having fun (Lu and Liu, 2015; Peder Alagöz, 2020; Ekiçi and Yeşilbursa, 2021), making learning eye-catching and effective (ChanLin, 2018; Boz, 2019; Garzon, 2019; Ekiçi and Yeşilbursa, 2021), and making it easier to understand topics, concepts, and content (Garzon, 2019; Saez Lopez, 2019; Karakaş, 2020; Arıcı et al., 2021).

When the limitations and requirements of environmental issues, the general characteristics of primary school children, and the educational benefits of augmented reality technology are evaluated together; It is thought that the use of augmented reality applications in environmental education will be effective. When the literature is examined, it is seen that there are not enough studies on environmental awareness and augmented reality at the primary school level. There has never been any study in the country where these two subjects were studied together; It has been determined that there are a limited number of studies abroad. The scarcity of studies in the literature on environmental awareness and augmented reality has made this study important.

This work; to raise environmental awareness at an early age, to guide researchers who want to work on environmental education and augmented reality in primary school; It is important in terms of introducing augmented reality technology, some augmented reality applications, and some activities that can be done with these applications to teachers and researchers. At this point, this research aims to examine the views of the effects of environmental education given using augmented reality applications on the environmental knowledge, attitudes, and behaviors of primary school third-grade students. For this purpose, answers were sought for the following two research questions:

1. What are the students' views on environmental education supported by augmented reality applications?
2. What effect does environmental education, in which augmented reality applications are used, have on the environmental knowledge, attitudes, and behaviors of primary school third-grade students?

Method

In this study, in which the effect of environmental education given by using augmented reality applications on the knowledge, attitudes, and behaviors of primary school third-grade students, and the views of children, the case study design, which is one of the qualitative research methods, was used. A case study is a detailed examination of an event with any possible method, in all its aspects (Yılmaz & Arık, 2022). Events in the case study; it is tried to be described in a multi-dimensional way in its natural environment, under time constraints (Punch, 2005, Hancock & Algozzine, 2006, Creswell, 2007). It is used to define and see the details that make up an event, to develop possible explanations for an event, and to evaluate an event (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2020). The effects of environmental education and children's views on this subject were tried to be examined in depth through AR-supported applications, which is the variable discussed in this study.

Study Group

The study group of the research; consists of 17 primary school third-grade students from a public school located in the Gülyalı district of Ordu province in the 2021-2022 academic year. Since mobile devices will be used during the application process, it was taken into account that the students to be selected for the study group have mobile devices that they own or that can be used in their schools. In addition, due to reasons such as the continuing effect of the COVID-19 pandemic, the longer the activities to be done with mobile devices as the number of students increase, and the difficulty of obtaining these devices; a class with a low number of students was selected.

Data Collection and Analysis

Environmental education was given to the study group by using augmented reality applications for six weeks (18 class hours). After six weeks of practice, a six-item semi-structured interview form was prepared by the researcher to get the opinions of the students on augmented reality applications and to shed light on the changes in environmental attitudes, behaviors, and knowledge dimensions as a result of environmental education through augmented reality. Semi-structured interviews allow the interviewee to express himself and provide in-depth information when necessary; it can affect the flow of the interview with side or sub-questions according to the flow of the interview and enabling the person to detail their answers; It has advantages such as providing time flexibility (Türnüklü, 2000; Büyüköztürk et al., 2020; Yıldırım & Şimşek, 2021). In the preparation of the form, the opinions of a classroom teacher, a Turkish teacher, and two field experts were taken and necessary arrangements were made in line with the feedback. To test the intelligibility of the questions, a preliminary application was made and it was determined that all the questions were understood. The interview was conducted with all students (n=17) in the study group. Before the interviews, necessary permissions were obtained and a voice recorder was used. The recordings were then transcribed. Two field experts were consulted to confirm the accuracy of the written transcript. In the analyses, code names (S1, S2, …, S17) were used for the students to ensure anonymity. The content analysis method was used in the analysis of the data. Content analysis; It is the process of bringing together and organizing similar data around certain concepts and themes. In content analysis, themes are found after data is coded; After the codes and themes are arranged, the findings are defined and interpreted (Şimşek, 2018). In this direction, firstly the data was coded, and then themes were created with similar codes. After the data were organized according to codes and themes, the findings were interpreted and conclusions were drawn. Analysis results are expressed with frequency values.

Findings

In this section, the findings related to each sub-problem are given below, respectively.

Students Views on Augmented Reality Applications

After the implementation process of the research was completed, with semi-structured interviews with all the students in the study group where environmental education was carried out with augmented reality applications; It is aimed to determine the thoughts of students about augmented reality applications. First of all, the children in the experimental group were asked how the use of augmented reality applications in the teaching of the

lessons made them feel. The frequency information of students' feelings about augmented reality applications is given in Table 1.

Table 1. Frequencies regarding students' feelings about AR applications

Theme	Code	*f*
Emotions	Good/Well	11
	Happy	8
	Funny	7
	Exciting	6
	Curious	3
	Pleasant	2

According to Table 1, for the question "How did you feel about the use of augmented reality applications in the teaching of the lessons?", 11 of the students answered good/beautiful, eight were happy, seven were fun, six were excited, three were curious, and two were pleasant. Accordingly, no negative emotional feedback was received from any student regarding the use of augmented reality applications in the course; It was observed that all of the students felt positive emotions towards the use of AR applications. Some of the students' views on how the use of AR applications in the course makes them feel are given below.

Table 2. Students' views on how AR applications used in the teaching of the course

Student	Quotation
S3	"I felt good, I was happy. I am pleased."
S4	"It was fun, I had a lot of fun, it was beautiful."
S5	"I felt good. I felt excited. I was curious."
S7	"I felt good. I thought the animals were real, they were standing next to me. I felt a real environment."
S8	"I felt that I loved nature. I felt good, I was happy."
S9	"I felt enjoyable. I felt excited. I am happy too."
S11	"I had so much fun, I was excited and curious."
S12	"I felt that I loved living things in nature. I felt that I loved this lesson very much. I was very excited in our first lesson. I got used to it in the next lessons. I tried to use apps at home as well."
S17	"I felt so good. It was exciting and it made me wonder."

Statistical information regarding the students' views on the augmented reality applications making their learning easier/difficult and their willingness/unwillingness to use AR applications in other lessons are given in Table 3.

Table 3. Frequency of students' opinions regarding augmented reality applications

Theme	Code		*f*
Learning	make it easy		17
	make it difficult		0
		Total	17
Desire to use in other lessons	want		17
	do not want		0
		Total	17

According to Table 3, all of the students (n=17) stated that the use of augmented reality applications facilitated their learning and they wanted to use it in other lessons.

Table 4. Student views regarding AR applications making learning easier/difficult

Student	Quotation
S6	"It made it easy. Because I learn better by having fun."
S7	"It made it easy. Because it was easier to work with tablets."
S8	"It made it easy. Because it felt real."
S9	"It made it easy. I learned more easily because I had fun."
S10	"It made it easy. Its processing with tablets and phones has been effective."
S13	"It made it easy. Because I learn more easily when I'm having fun."
S14	"It made it easy. Because it's applied as if it were real life."
S15	"It made it easy. It's nice to have it on a tablet. I also applied it at home."
S16	"It made it easy. He was showing everything one by one."
S17	"It made it easy. Because animating using a tablet was impressive."

Statistical information about the reasons for students who want to use augmented reality applications in other courses and their views on which courses they want to use are given in Table 5.

Table 5. Frequency information of students' reasons for desiring to use AR applications in other courses and their opinions about the courses they want to use

Theme	Code	*f*
Reason for the desire to use AG	Have fun	8
	Make learning easier	7
	Like	2
	Love Turkish lesson	2
	Boring math class	1
	Adding joy to lessons	1
Lesson	Turkish	14
	Life Sciences	12
	Maths	10
	All lessons	5

According to Table 5, all of the students (n=17) stated that they wanted to use augmented reality applications in other lessons. When asked why they want to use augmented reality applications in other courses; According to Table 5, eight of the students answered that it was fun, seven of them made learning easier, two of them liked the Turkish lesson, two of them liked it, one of them added beauty, and one of them answered that the mathematics lesson was boring.

According to Table 5, all of the students (n=17) stated that they wanted to use augmented reality applications in other lessons. When asked why they want to use augmented reality applications in other courses; According to Table 5, eight of the students answered that it was fun, seven of them made learning easier, two of them liked the Turkish lesson, two of them liked it, one of them added beauty, and one of them answered that the mathematics lesson was boring. As for the question about the courses they want to use augmented reality applications; 14 of the students answered in Turkish, 12 in life sciences and 10 in mathematics, five of them stated that they would like to use it in all lessons. “Would you like to use augmented reality applications in other lessons? In which lessons would you like to use it? From where?" Some of the answers given by the students to the question are given below.

Table 6. Student opinions on AR applications in using for other lessons and their reasons

Student	Quotation
S1	"Yes. Turkish, life science. To learn easily, to have fun.”
S2	"Yes. Life science, Turkish. Because I learn more easily.”
S5	"Yes. In every lesson. Because it's more fun and I can learn easily.”
S6	"Yes. Maths. I don't like math class because it's boring. I think it will be fun if we work with AG.”
S7	"I would have liked to. In all classes. Because I liked the animation of beings and I had fun. “
S8	"I would have liked to. Maths. Because math is hard. Easy to learn.”
S10	"Yes. In all classes. Because the lessons would be even more fun.”
S12	"Yes. Mathematics, life studies, Turkish. Since I don't like math, I would like it because I like it more. Because we do fun activities.”
S13	"Yes. Mathematics, life science, briefly in all courses. Because I'm having fun and who wouldn't want to have fun."
S14	"Yes. Mathematics and Turkish. Because we would see the difficulties in mathematics with video and we would learn easily. In Turkish, if our reading is bad, we can use it to correct our reading.”
S17	"Yes. Life science. Because at that time, the animation would be done and we would learn easily.”

The Effect of Environmental Education Using Augmented Reality Applications on Students' Environmental Awareness

After the implementation process of the research was completed, with semi-structured interviews with all the students in the study group where environmental education was carried out with augmented reality applications; It is aimed to determine the changes in environmental awareness of students after augmented reality applications. The frequency information of the students' views about the effect/not effect of the environmental education given using AR applications on the approach to living/non-living things and the changes in their interests towards the environment and environmental problems are given in Table 7.

Table 7**.** Frequency information of students' opinions on the effects/failure of the effects of environmental education given using AR applications

Theme	Code	*f*
Approach to living/non-living things	Affected	17
	Not affected	0
Interest in the environment and environmental problems	Positive change/Increased interest	17
	Adverse change/Decreased interest	0

According to Table 7, all of the students (n=17) stated that the environmental education given using augmented reality applications affected their approach to living/non-living things; They stated that they experienced an increase/positive change in their interest in the environment and environmental problems. “Have augmented reality applications affected your approach to animate/inanimate objects? Some of the answers given by the students to the question "If it did, how did it affect it?" are shared below.

Table 8. Student opinions on students’ approach to living/inanimate beings

Student	Quotation
S1	"Impressed. To love animals, to give them food, not to hit them.”
S4	"Impressed. I now recycle the garbage.”
S5	"Impressed. I used to treat living things badly, now I treat them better.”
S6	"Impressed. I'm warning everyone. We adopted the cat. I am interested in plants.”
S7	"Impressed. For example, I was not watering the plants, now I am watering them. I started to love animals more, I give water and food to the animals on the street.”
S8	"Impressed. I didn't know before that trees were cut down and turned into fields, now I know. I learned that plants breathe. I learned about his other features.”
S9	"Impressed. Well, impressed. I became more sensitive than before.”
S11	"Impressed. I used to think that the air and the soil were alive, but now I've learned. I inform my friends about living and non-living things.”
S12	"Impressed. Normally I didn't like some animals, but now I love all animals.”
S13	"Yes. I got more information. I'm kinder to animals."
S14	"Impressed. I used to be afraid of the bird in our house, now I can pick it up without being afraid of it. I don't get mad at him when he bites my hand, and he's used to me. I pour the water that I cannot drink into the bottom of the plants. I feed the cats and dogs.”
S15	"Impressed. I plant and water the plants. I feed stray dogs.”

The frequency information of the students' views on environmental gains as a result of environmental education using AR applications is given in Table 9.

Table 9. Frequencies of students' opinions on environmental acquisitions as a result of environmental education using AR applications

Theme	Code	*f*
Academic achievement	Environmental information	7
Eco-friend Behaviors	Keeping the environment clean	15
	Feeding living things	13
	Treating living things better	9
	Recycle waste	8
	Warn people about environmental pollution	4
	animal adoption	3
	Nest for animals	3
	Treating animals	2
	Planting trees	2
	Making a financial contribution to the protection of living things	1
	Information about living and non-living things around	1
	Taking care of plants	1
Values and Attitudes	Loving living things	6
	Be sensitive	6
	Empathy	2

When the academic achievement theme in Table 9 is examined, the students stated that they gained knowledge about the environment as a result of the environmental education given using augmented reality applications.

The opinions of the students that they have gained knowledge about the environment as a result of the environmental education given by using augmented reality applications are given below.

Table 10. Students' opinions on environmental knowledge as a result of AR-supported environmental education

Student	Quotation
S2	"If we pollute the environment, our world will be polluted."
S7	"I learned that perfumes harm nature."
S8	"I learned that global warming will bring the end of our world. I didn't know before that trees were cut down and turned into fields, now I know. I learned that plants breathe. I learned about his other features."
S10	"I learned good manners."
S11	"I didn't know about global warming before and now I know. I learned many problems for the first time. I used to think that the air and the soil were alive, now I know."
S13	"I learned more. I already knew about environmental issues, but I learned more. If the garbage is ingested by living things, they can get stuck in their throat and die."
S17	"I learned that we shouldn't pollute the forests."

Looking at the theme of environmentally friendly behaviors in Table 9; Keeping the environment clean (n=15), feeding living things (n=13), warning people about environmental pollution (n=13), treating living things better (n=9), recycling waste (n=8), animals to make a home for people (n=3), to adopt animals (n=3), to protect animals (n=2), to treat animals (n=2), to plant trees (n=2), to inform about living and non-living things around (n=2). n=1), contributing financially (n=1), and taking care of plants (n=1) for the protection of living things. Some of the opinions of the students showing that they have gained environmentally friendly behavior as a result of environmental education using augmented reality applications are given below.

Table 11. Students' eco-friend behaviors as a result of AR applications and environmental education

Student	Quotation
S1	"When I see an animal and it is cold, I make a nest and feed it. I throw garbage and waste in the trash or recycle."
S2	"I do not throw garbage into nature. I give food when the living is hungry."
S4	"I feed the animals. I used to throw the garbage in the trash, now I recycle it."
S5	"I used to treat living things badly, but now I treat them better. When I find an animal outside, I take it to our house. I tell my mother if there is an emergency, we take her to the vet. I keep nature clean. I don't throw garbage into the water."
S6	"I'm warning everyone. We adopted the cat. I am interested in plants. My grandfather was always burning the stove. I warned him, he doesn't hurt that much anymore about air pollution. I feed the living. I take medicine for sick creatures. I feed the living and water the plants."
S7	"For example, now I collect the garbage around. For example, I was not watering the plants, now I am watering them. I warn people who apply perfume. I feed the living. Sometimes I nest them. I send waste batteries for recycling. I recycle the waste."
S8	We took our cat from the street and fed it. I water the plants. I protect animals."
S10	"I started to warn people who pollute nature. I do not pollute nature. I feed the living. I help those who need help. If I see garbage on the floor, I throw it in the trash."
S11	"I feed the animals. I do not throw garbage in nature. I plant trees. I inform my friends about living and non-living things."
S12	"I used to throw my garbage out all the time, now I throw it in the recycling bins. I used to pluck the plants, but I don't anymore. I take the animals that need help home, give them milk and feed them. I take care of my cats and dogs."
S14	"For example, when I see a starving cat and dog, I put milk in front of it. I bathe them. I used to be afraid of the bird in our house, now I can pick it up without being afraid of it. I don't get mad at him when he bites my hand, and he's used to me. I pour the water that I cannot drink to the bottom of the plants."
S15	"I feed the animals; I give them water. I love them and they love me too. I spend 2-3 TL a day for them. I throw the garbage in the trash. I recycle the waste."
S16	"If I see someone throwing garbage around, I will warn them. I tell him to throw his waste in the recycling bins."

When we look at the values and attitudes in Table 9; It is seen that the students gave the answers to love living things (n=6), being sensitive (n=6), and empathy (n=2). Some of the values and attitudes that the students stated that they gained as a result of environmental education using augmented reality applications are given below.

Table 12. Students view on the value and attitude towards the environment as a result of AR applications and environmental education

Student	Quotation
S3	"I am more affectionate towards animals."
S7	"I started to love animals more."
S9	"I am more sensitive than before."
S11	"I was very sad after seeing those who pollute nature."
S12	"Normally I didn't like some animals, but now I love all animals. I saw factory fumes on the way to the market and I didn't like that situation."
S13	"I am more interested in these issues. I was very sad to see that the campers left their garbage in the forests and left."
S15	"I used to be interested, but now I'm more interested."
S17	"I got closer to living things."

As can be seen from the answers of the students, many children stated that they are now more interested and sensitive to living things. Moreover, they stated that they felt closer to living things. It is thought that this situation is due to their better assimilation of living conditions.

Results and Discussion

In this research, students' views and effects on environmental education through augmented reality applications were examined. The results of the research and the discussions based on these findings have been tried to be explained within the scope of the relevant literature. In this context, the conclusion and discussion part of the research; was discussed based on the findings related to the sub-problems of the research.

In the first sub-problem of the research, students' views on augmented reality applications were examined. According to the findings, all of the students have positive emotions towards the use of AR applications. Students stated that they felt curious about using AR applications (See Table 1). One of the educational benefits of augmented reality applications is that it increases motivation towards the lesson (Radu, 2012; Dibrova, 2016; Akçayır & Akçayır, 2017; Boz, 2019; Arıcı et al., 2021). In intrinsic motivation, one of the motivation types, the sense of curiosity is at the forefront, and the learning period of students who are motivated in this way is extremely fast (Belo, Van Driel, & Verloop, 2010). In addition, students stated that it is fun to use augmented reality applications in lessons (See Table 1). There are studies in the literature that students find AR applications fun (Karakaş, 2020). Looking at the other answers of the students; it is seen that the majority of them gave happy, good/well, and exciting answers (See Table 1). It is thought that students who have a high sense of curiosity and excitement, participate in the teaching process with fun, feel happy and good will be more willing to the lesson, will actively participate in the lesson, and have high motivation. In addition to these, a student; stated that he felt as if the animals he saw on the screen were standing next to him during AR applications. This again supports the studies stating that AR technology provides a sense of reality (Carmigniani et al., 2011; Küçük et al., 2015).

When the findings related to the facilitation/difficulty of students' learning by using AR applications are examined; It was concluded that the use of augmented reality applications facilitated students' learning (See Table 3). This result is similar to studies showing that AR technology facilitates the understanding of subjects, concepts, and contents (Akçayır and Akçayır, 2017; Boz, 2019; Karakaş, 2020; Arıcı et al., 2021). In the answers given by the students; they stated that they learned by having fun, adding a sense of reality, and using mobile devices made it easier for them to learn (See Table 4). When the answers to the question of whether they want to use AR applications in courses other than science are examined, it can be concluded that all of the students wanted to use augmented reality applications in other lessons as well (See Table 3). In studies where augmented reality is used, it is seen that students want to use AR technology in courses other than the applied course (İzgi Onbaşılı, 2018; Karadavut, 2021; Creator, 2022). When asked which courses they would like to use, it is determined that it is desired to be used in all courses as well as Turkish, life studies, and mathematics courses (See Table 5). When asked why they want it, since it is funny; it facilitates learning; they find the mathematics lesson boring and they do not like it; they like the Turkish lesson and they like AR applications (See Table 5). It is concluded that students who experience augmented reality technology want to continue this experience. Additionally, it has been concluded that environmental education with augmented reality applications is effective on students' environmental knowledge. In the answers given by the students to the interview questions; they stated that they learned the truth of some existing false information about the environment, that they had access to new information in addition to their existing information as a result of the

application, and that they learned many information about the environment for the first time (See Table 10). Similar to this study, there are studies illustrating that augmented reality technology increases environmental knowledge (Koutromanos, Tzortzoglou, & Sofos, 2018; Theodorou et al., 2018; Safitri et al., 2022).

Moreover, the results of this study reveal that environmental education with augmented reality applications is effective on students' environmental behavior. Considering the answers given by the students to the semi-structured interview questions; it has been determined that they have acquired different behaviors in addition to the behaviors that are aimed to be developed in the Primary School Science Curriculum and included in the scale (See Table 9). Keeping and protecting the environment in which they live in the Primary School Science Curriculum; being thrifty in the use of resources, acquiring awareness of savings and gaining individual responsibility; In the scale used, behaviors such as warning those who pollute nature and harm living things, being thrifty and gaining recycling awareness are included. In addition to these, looking at the answers given by S4 S5, and S12; He stated that while he was always throwing his garbage out, he now throws it in the recycling bins and that he used to pluck the plants, but not anymore. These answers given by the students show that some negative behaviors towards the environment turn into eco-friendly behaviors after environmental education through AR. Therefore, it shows the effect of environmental education on environmental behavior with augmented reality applications. In addition to these, S15 stated in his answer that he spends 2-3 TL per day for animals. According to Erten (2012); It is called environmentally friendly behavior that individuals make financial contributions (both physical and monetary expenditures, etc.) to reduce or eliminate environmental problems when necessary. It should be taken into account how much people can sacrifice materially or morally for an environmentally beneficial behavior. Accordingly, the answer to S15 can be shown as an example of environmentally friendly behavior that is not included in the Primary School Science Curriculum. When the answers of the students were examined; It was also determined that different behaviors such as feeding living things, owning animals, treating animals, building a nest for animals, informing people about living and non-living things, and planting trees were also exhibited by the students (See Table 9). Studies illustrate that augmented reality technology can improve environmentally sensitive behaviors (Safitri et al., 2022) and have a positive effect on environmental behaviors (Aliabadi, Jafari, & Ardakani, 2021).

As another outcome of the study, it has been concluded that environmental education with augmented reality applications is effective on students' attitudes towards the environment. When the answers given by the students to the semi-structured interview questions are examined; It has been determined that there are changes in some values and attitudes as well. For example, S3; was more affectionate towards animals, S7; started to love animals more, S9; behaved more sensitively than before, S12; normally doesn't like some animals but now he loves all animals; S13 said that he was more interested in these issues and was very upset when he saw that the campers left their garbage in the forests, S15; In the past, he was also interested, but now he is more interested, S17; He stated that he got closer to living things. From these answers of the students, after environmental education with AR applications; It is understood that their current attitudes have improved further and some of their negative attitudes have turned into positive ones. This shows that environmental education given through augmented reality has a positive effect on attitudes towards the environment. When the literature is examined, there are similar studies that augmented reality is effective in developing attitudes toward the environment (Lee & Yoon, 2020; Aliabadi, Jafari & Ardakani, 2021). Furthermore, in terms of students' attitudes towards living/non-living things; It can be stated that there is an increase/positive change in their interest in the environment and environmental problems (See Table 7). When the answers of the students are examined, it is seen that this effect is positive; It has been determined that students are more sensitive, especially towards living things, acquire some new positive behaviors and turn their negative behaviors into positive ones (See Table 8). Within the scope of this research, it has been concluded that environmental education with augmented reality applications is effective on students' environmental awareness. From the statements by the students to the interview questions; it is seen that they have gained gains related to knowledge, attitude, and behavior, which are the sub-dimensions of environmental awareness (See Table 9). This result, Safitri and others in their study in 2022; is similar to the conclusion that augmented reality increases students' awareness of the environment.

In summary, it has been observed that using augmented reality applications, in environmental education has positive effects on environmental knowledge, attitudes, and behaviors of primary school third-grade students. Students found the augmented reality applications fun and interactive. Thanks to the applications, they increased their knowledge about the environment, developed awareness about environmental problems, and displayed positive attitudes. In addition, students stated that augmented reality applications facilitated their learning. As a result, this research has shown that the use of augmented reality applications has a significant potential in environmental education. Primary school third-grade students are positively affected by their environmental knowledge, attitudes, and behaviors with augmented reality-based environmental education. Therefore, it is recommended that educators use augmented reality technology in environmental education. It is important for

future research to further examine the impact of augmented reality applications on students of different age groups and different educational content.

Recommendations

Based on the results and experiences obtained in this research, the following suggestions have been made to guide researchers and practitioners in new studies on augmented reality and environmental education. Both in Turkey and at the international level; It is seen that studies examining the effect of environmental education on environmental awareness through augmented reality technology are not sufficient. For this reason, it is recommended to conduct studies on this subject in different classes at different grade levels. Additionally, in this study, the students expressed their opinion that they want augmented reality applications to be used in other lessons. In this direction, it is recommended to integrate augmented reality technology into the curriculum of all courses. Adding augmented reality technology to the curriculum and teaching it as a course in education faculties or including it as a separate subject in the courses. At the same time, it is recommended to give in-service training to teachers about augmented reality technology and its applications. These trainings will lead to active use of AR technology in all courses. Lastly, only primary school students were included in this study and their opinions were taken as basis. In addition, the application process was carried out by the researcher. In similar studies, the application process can be carried out by the teacher of the course and the opinions of these teachers about the research can be consulted. In this way, the students' answers can be compared with the teachers' answers.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Evaluation of Child Visitation Centers in Turkey

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Abstract: Divorce rates in Turkey have increased over the years and the number of children subject to custody after divorce rise rapidly. Courts decide whether a child whose custody is given to one of his parents should establish a personal relationship with the other parent. Children with divorced parents need to meet with their parents. Additionally, the right of the parent who lost custody to establish personal contact and meeting with his child is a right provided by the court. The process of meeting parents who have lost custody with their children cannot be done in a healthy way due to the problems experienced between divorced parents. Based on this problem, this study addressing the purpose of establishment and functioning of Child Visitation Centers established in Turkey in 2022, is to present a conceptual framework and make suggestions for implementation.

Keywords: Conflict divorce, Child after divorce, Custody child visitation center

Introduction

The family institution is the fundamental structure that constitutes society and is essential for the continuity of society. The boundaries of the family, which takes shape within the framework of certain principles from a societal perspective, are also defined by legal rules derived from the societal structure. Within the Turkish societal structure, marriage law is determined by the Turkish Civil Code, numbered 4721. According to this law, individuals who have reached the age of 18, possess the capacity to distinguish, and do not have any impediments specified in the law, such as consanguinity, legal incapacity, or mental illness, are eligible to enter into marriage.

After industrialization, the family has shrunk and transformed into the nuclear family structure consisting of parents and children in modern society. Post-modernity has witnessed transitions to family structures with different characteristics than the nuclear family. When examining family structures today, there is an increase in single-parent families, rising divorce rates, and the emergence of new types of families. In a society where individualism is on the rise, the desire for the freedom of living alone, the desire to have children without being a father, and the increase in divorce rates contribute to the increase in the number of single-parent families (Giddens, 2000). Nevertheless, the family continues to fulfill certain functions. These include the reproduction of the population, childcare, socialization of new individuals, regulation of sexual behavior, and the existence of a source of affection (Zastrow, 2015).

Theorists also view the family as a meso system composed of interrelated and sub-systems. According to the system theory, in a family with two children, four subsystems are formed. These are the individual, the marital couple, the parent-child, and the sibling subsystem (Bernier et al., 2021; Cox & Paley, 2003). In a family with four subsystems, when spouses want to get divorced, they only need to terminate the marital couple subsystem in a healthy manner. However, in almost all societies, individuals perceive divorce as a form of annihilation and believe that the other subsystems will also close. They think they will not be able to exist as individuals, cannot

maintain the parent-child relationship, and that the sibling subsystem will also close. In reality, a healthy divorce only terminates the marital relationship. Of course, after divorce, individuals' lives are affected in social, economic, psychological, legal, social, and individual aspects, and they need to reorganize their lives (Leopold, 2018). In summary, couples who want to divorce first need support in ending the marital couple subsystem in a healthy way and then in adapting to a new life.

The divorce process is defined as the legal process through which couples terminate their marital union. The divorce process can be carried out through mutual agreement and compromise, or it can be a contentious process involving disputes and conflicts. It is a process that requires the resolution of issues such as the custody of children born during the marriage and the division of assets. Therefore, whether the divorce process proceeds as an uncontested or contested divorce is significant in terms of the issues that need to be resolved during the divorce process. The increasing rate of divorce in recent years has made this issue more visible. According to the provisions of the Turkish Civil Code currently in effect, the grounds for divorce are defined as follows: (1) adultery, (2) attempted murder, severe cruelty, or dishonorable conduct, (3) committing a crime and leading a disgraceful life, (4) abandonment, (5) mental illness, and (6) breakdown of the marital union (Turkish Civil Code, 2001: Articles 161-166).

According to the data from the Ministry of Justice, General Directorate of Judicial Records and Statistics, in 2021, the number of divorce cases filed was 279,557, while in 2022, this number increased to 289,088 (General Directorate of Judicial Records and Statistics, 2022; 2023). According to the data from the Turkish Statistical Institute (TSI), in 2021, there were 175,779 couples divorcing, and in 2022, this number rose to 180,954 couples. The crude divorce rate in 2021 was 2.09, and in 2023, this rate increased to 2.13 (TSI, 2023). The table below provides divorce statistics for the past 10 years. According to the statistics, it can be observed that 1,436,088 couples have divorced in the last 10 years.

Table 1. The divorce figures in the last 10 years (TSI, 2023)

Variables (Year)	Mean Number of divorces
2013	125.305
2014	130.913
2015	131.830
2016	126.164
2017	128.411
2018	143.573
2019	156.587
2020	136.570
2021	175.779
2022	180.954
Total	1.436.086

According to data from the Ministry of Justice, General Directorate of Judicial Records and Statistics, in Turkey, in 2021, almost all divorces that took place in civil courts (96.8%) were reported to have occurred due to the fundamental breakdown of the marriage (General Directorate of Judicial Records and Statistics, 2022). When examining TSI data on divorces, it can be seen that a significant portion of divorces occur within the first three years of marriage. According to this data, in 2021, 22.3% of divorces, and in 2022, 21.6% of divorces took place within the first three years of marriage. When divorce reasons are examined, incompatibility is found to be the most common reason for divorce. In 2021, 97% of divorces occurred due to incompatibility, while in 2022, this rate was 96.7% (TSI, 2023). According to a study conducted by the Directorate General of Family and Community Services of the Ministry of Family, Labor, and Social Services (formerly known as the Ministry of Family and Social Policies) with individuals who have divorced at least once, the three most common reasons for divorce were found to be irresponsible and indifferent behavior (51%), inability to provide for the household economically (30%), and disrespectful behavior towards each other's families (24%) (Ministry of Family, Labor, and Social Services, 2019). According to the data from the TSI, in 2022, 574,358 couples got married in Turkey. In the same year, there were 180,954 divorces, and 180,592 children were subject to custody arrangements (TSI, 2023).

After divorce, children, as determined by the courts, live with one of their divorced parents, while the other parent has the right to establish a personal relationship with them. This study addresses the Child Visitation Centers, which began providing services related to child custody and establishing personal relationships with

children in Turkey starting from 2022. The study evaluates the functioning and practices of these centers in this context.

Divorce and Children

Divorce is not merely a situation affecting individuals who have been married. It is an action that impacts not only the divorcing individuals but also their respective families of origin, close circles, and the children born from the marital union. The fact that 180,592 children were subject to custody arrangements in 2022 highlights the significance of the divorce process for children (TSI, 2023). The table below provides the numbers of children subject to custody arrangements in the last 10 years. According to the statistics, it can be observed that 1,274,546 children have been involved in custody cases in the last 10 years.

Table 2. The number of children subject to custody arrangements in the last 10 years (Source: TSI, 2023)

Variables (Year)	Mean Number of divorces
2013	102,120
2014	107,337
2015	109,978
2016	106,460
2017	108,297
2018	125,768
2019	140,858
2020	125,948
2021	167,188
2022	180,592
Total	1.274.546

According to the Turkish Civil Code, individuals who have not reached the age of 18 and are therefore not legally adults are under the custody of their parents (Article 335). Under this law, the following principles have been established regarding custody and establishing personal relationships after divorce:

i. In divorce proceedings, the court issues a custody order concerning the common children born from the marital union, regulating the personal relationship between the parents and the child (Article 182/1).
ii. The court warns that if the requirements arising from the personal relationship arrangement specified in the court decision cannot be fulfilled, the custody may be changed in the best interests of the child (Article 182/2).
iii. After divorce, each parent who does not have custody or has not been granted custody has the right to request the establishment of a personal relationship with the child (Article 323).
iv. Parents are obligated to refrain from harming the personal relationship between the child and the other parent and from obstructing the child's education and upbringing (Article 324/1).
v. If the parent to whom custody has been granted by court decision fails to fulfill the requirements of the personal relationship arrangement, custody may be changed in the best interests of the child (Article 324/3).

During the divorce process, the court judge takes into consideration the child's views and opinions regarding custody. At the same time, the court judge may request a social investigation report from experts (social worker, psychologist, pedagogue) regarding the custody of the child and the establishment of a personal relationship. Based on the information gathered, the court judge makes decisions on custody and personal relationship arrangements within the framework of the child's best interests. When examining the data from TSI (2023), it is observed that in the last 10 years, custody was granted to the mother in 75.25% of cases and to the father in 24.8% of cases. The fact that three out of every four children whose parents are divorced are placed under the custody of the mother can be attributed to the mother being the primary caregiver of the child. Additionally, the child's primary attachment figure being the mother and the scientific literature defining the mother as a secure haven (Bowlby, 1988/2020; Bowlby, 1979/2014) may influence the recommendations made by experts preparing custody reports in this direction.

Childhood neglect, abuse, as well as parental loss, separation from parents, and their divorce are traumatic events for children (Herman, 2016). Children of divorced parents experience individual and societal problems. At the individual level, these problems manifest as emotional and psychological issues, including anger

problems, defiance/non-compliance with rules, insecurity, anxiety, depression, low self-esteem, and socialization difficulties (Amato, 2000). The mental health of children whose parents have divorced is negatively affected due to witnessing conflicts during the divorce process, experiencing economic difficulties, and perceiving their parents as inadequate (Aral & Gürsoy, 2000). Children of divorced parents also feel stigmatized in society. When they realize that they don't have the "ideal family" they may have imagined, where "mom and dad are together," they might perceive it as a deficiency. Consequently, children who feel stigmatized because of this belief tend to withdraw from social relationships and friendships.

For children who consistently want to have both parents, divorce has a distressing impact. Children whose parents have separated or divorced may act as if their parents have never separated and may try to prevent the divorce. However, the separation or divorce of parents creates a trauma of loss for the child (Ruppert, 2014). Research has shown that children of divorced parents experience increased levels of depressive feelings, exhibit behavior problems, and have lower academic achievement (Öngider, 2013). Due to the impact of divorce on the child, it is crucial for the divorce process to be carried out in a healthy manner, and the child's personal relationship with the non-custodial parent should not be hindered. The quality of the child's relationship with their parents is a significant factor for children of divorced parents to adapt to the divorce (Ravitz, 2011). Overcoming the uncertainty, insecurity, and anxiety that divorce may create requires consistent behavior from parents (Tezcan, 2017).

Child Transfer and Establishing a Personal Relationship with the Child: Child Visitation Centers

In Turkey, the implementation of court decisions related to child transfer and establishing a personal relationship with the child was conducted within the framework of the Enforcement and Bankruptcy Law until 2022. The Enforcement and Bankruptcy Law, which primarily deals with debt and creditor relations, has been a subject of debate in the field of child protection for many years. The practice of executing custody and personal relationship arrangements for children through Enforcement Offices has led to the attachment of children's assets. In this context, the custodial parent, the parent with the right to establish a personal relationship, and the child were categorized as creditors and debtors. The procedures related to child custody and transfer, carried out within the framework of this legislation, have led to violations of children's rights, as they have been treated within the context of creditor and debtor relations. Moreover, the practice of law enforcement officers and law enforcement authorities accompanying the custodial parent to the non-custodial parent's home for the child transfer has violated the privacy of the family in public. This practice has deviated significantly from being child-centered. These practices, often carried out without adequately preparing the child psychologically and under sometimes inappropriate conditions, have occasionally undermined the child's right to see the other parent. The increase in divorce rates and, as a result, the growing number of children subject to custody arrangements has brought this issue to the forefront.

In 2021, in order to resolve the issues related to child transfer and establishing a personal relationship with the child while considering the best interests of the child, the Child Protection Law added Article 41 (Law on Amendment of the Enforcement and Bankruptcy Law and Some Laws, 2021). Based on this law, in 2022, the Regulation on the Implementation of Decisions and Precautionary Decisions Regarding Child Transfer and Establishing a Personal Relationship with the Child was published, providing details on the implementation. To understand the functioning of Child Visitation Centers (CVC), it is necessary to explain the legal regulations and institutional structures related to the subject. Following the stipulation that the decisions and precautionary measures regarding child transfer and establishing a personal relationship with the child, which are issued by the courts, will be executed by the Directorate of Legal Aid and Victim Services (Child Protection Law, 2005: Additional Article 41/A-1), Child Visitation Centers began to be established as centers affiliated with the Directorate of Legal Aid and Victim Services starting from 2022. Child Visitation Centers are responsible for executing court decisions related to child transfer and establishing a personal relationship with the child.

The Directorates of Legal Aid and Victim Services are established within the courthouses and are affiliated with the Ministry of Justice. They house experts such as psychologists, pedagogues, and social workers. These directorates are responsible for conducting practices that prioritize the best interests of the child. They aim to prevent the children from being traumatized by expediting procedures related to children, reducing the anxiety of victimized children during the process of taking their statements and testimonies, providing support for children to express themselves comfortably, informing children about legal procedures in line with their developmental levels, ensuring that children can express themselves before decisions are made about them while safeguarding their rights, and taking necessary measures to prevent actions that may traumatize the children (Regulation on Legal Aid and Victim Services, 2021: Article 6). The Directorates of Legal Aid and Victim

Services also provide services related to family court referrals, family, divorce, or parental counseling for parties, suggesting appropriate measures for the children and parents, and proposing suitable measures for the obligations arising from the marital union and their relationship with common children. These services align with the main mission of the Directorates of Legal Aid and Victim Services. In this context, the establishment and implementation of Child Visitation Centers affiliated with these directorates aim to harmonize with the core mission and services of the directorates. In order to understand the new legal regulations regarding child transfer and establishing personal relations with the child, it is necessary to touch upon some concepts mentioned in the law and regulation. These concepts specified in the Regulation on the Implementation of Judgments and Interim Measures for Child Transfer and Establishment of Personal Relations with the Child are child transfer, right holder, personal relationship, and obligated person.

- *Child transfer:* The process of taking the child from the obligated person and delivering them to the right holder as required by the court decision regarding custody (Article 4/1-d).
- *Right holder:* The right holder is defined in two different ways. Firstly, it is the party holding custody in the child transfer process. Secondly, it is the party to whom custody is not granted, but with whom a personal relationship with the child is established (Article 4/1-f). As the definition implies, the custody holder is the right holder in child transfer. The person granted the right to establish a personal relationship with the child during the process is also defined as the right holder.
- *Personal relationship:* It is the right granted to the party for a certain period of visitation or staying with the child in accordance with the court decision, to whom custody has not been granted (Article 4/1-g).
- *Obligated person:* The party to whom custody is granted by the court, who is responsible for ensuring that the child establishes a personal relationship with the other parent within the specified period and in the specified manner. However, the obligation also refers to the party who must hand over the child to the custody holder at the end of the personal relationship they establish with the child (Article 4/1-n).

The concepts explained above can be illustrated with the following example:

Example 1: Let's assume that there is a court decision granting custody (right holder) to the mother (obligor) of a child. The court order allows the father (right holder) to have personal visitation with the child on weekends, from Friday evening at 5:00 PM until Sunday evening at 5:00 PM, which includes two nights and two days of visitation. In this scenario, after the father has spent time with the child during the specified personal visitation period, he is required to return the child to the mother (child transfer). This transfer is the obligation of the father (obligor), and it takes place at the end of the personal visitation period, as stipulated by the court order. The newly added provisions in the Child Protection Law cover several fundamental aspects regarding the institutional structure and operation. Under the heading "Responsible and Authorized Units," the following key points are addressed:

- The responsibility for implementing court decisions regarding child transfer and establishing personal relationships with the child lies with the Directorates of Judicial Support and Services for Victims.
- In judicial districts where the Directorates of Judicial Support and Services for Victims are not present, this duty will be carried out by the legal affairs bureaus of the civil courts.
- The competent authority for implementing these court decisions is the bureau located at the child's place of residence.
- During the execution of these decisions, specialists such as psychologists, pedagogues, social workers, child development experts, or guidance counselors should be involved. However, in cases where such specialists are not available, teachers may be assigned to the task.[1]
- The list of specialists to be engaged in these procedures will be determined through a list prepared by the governorships (Child Protection Law, 2005: Additional Article 41/A).

The Directorate of Legal Aid and Victim Services carry out two primary tasks through Child Visitation Centers: (1) the execution of judgments and decisions regarding child custody and (2) the execution of judgments or precautionary decisions regarding personal relations with the child. The relevant law specifies the procedures and processes for these practices as follows. In the execution of judgments or precautionary decisions regarding child custody:

[1] During the implementation of court decisions regarding child transfer and personal relationship establishment for children, the experts accompanying the child at the Child Visitation Centers established within the Directorate of Legal Aid and Victim Services will be compensated for each handover process they are actively involved in, as stipulated in the legislation (Child Protection Law, 2005: Article 41/H).

- If the judgment regarding child custody is not voluntarily fulfilled by the responsible party (the one without custody), the entitled party (the one with custody) can apply to The Directorate of Legal Aid and Victim Services for the enforcement of the judgment.
- The Directorate of Legal Aid and Victim Services contacts the responsible party using any means of communication, notifies them to bring the child to be delivered to the entitled party at the specified date and time, and documents the process.
- If the obligated person cannot be reached or declares that they will not bring the child, the Directorate of Legal Aid and Victim Services issues an order for the immediate delivery of the child. In this order, the responsible party is informed that they must bring the child to the specified location on the specified date and time. If they have a valid excuse preventing them from delivering the child on the designated date, they should contact the Directorate of Legal Aid and Victim Services before the delivery date to request that the child be taken into custody by the directorate. If they fail to deliver the child or provide a valid excuse for not complying with the order, it is stated that the child will be taken into custody with the assistance of experts and, if necessary, with the support of law enforcement. Non-compliance with the order can result in disciplinary imprisonment.
- The child, who is brought or taken into custody by the Directorate of Legal Aid and Victim Services at the specified date and time, or could not be delivered by the responsible party due to a valid excuse, is handed over to the rights holder by the Directorate.
- In the event that the order for handover is not complied with by the obligated party, the Directorate of Legal Aid and Victim Services will promptly retrieve the child from their current location, with the support of law enforcement if necessary, and deliver them to the right holder (Child Protection Law, 2005: Article 41/B).

Regarding the execution of the decisions or precautionary measures for establishing personal relationships with the child:

- If the obligated party (custodial parent) refuses to willingly establish the personal relationship between the child and the right holder (the one with the right to establish a personal relationship), the right holder can apply to the Directorate of Legal Aid and Victim Services to ensure the execution of the court decision for the personal relationship.
- The Directorate of Legal Aid and Victim Services will use all means of communication to contact the obligated party and inform them about the specified date and time for delivering the child to the right holder for the establishment of a personal relationship. The process will be documented.
- If contact cannot be established with the obligated party or if the obligated party declares that they will not bring the child, the Directorate of Legal Aid and Victim Services issues an order for the establishment of a personal relationship. In this order, the obligated party is informed that they must bring the child to the specified location at the date and time determined in the court decision or by the Directorate. If they have a legitimate reason preventing them from doing so, they must contact the Directorate before the delivery date to request that the child be taken into custody by the Directorate. It is further emphasized that failure to comply with the order may result in disciplinary detention.
- The child, brought to the date and time specified by the Directorate of Legal Aid and Victim Services, is delivered to the right holder (the person with the right to establish a personal relationship). The right holder is informed that they must bring the child to the designated location at the end of the period specified in the court decision. Failure to do so, except for valid reasons, may result in disciplinary detention and a criminal complaint being filed against them. These details are recorded in a report.
- If, after establishing a personal relationship, the child cannot be handed over to the responsible party (the custodian) or the person designated by the responsible party by the right holder (the person with the right to establish a personal relationship), the child is left with the right holder. In cases where this is not possible, at the request of the Directorate of Legal Aid and Victim Services, the child is handed over to the Provincial Directorate of Family and Social Services, and temporary measures are taken for the child's shelter.
- If the responsible party (custodian) requests the child to be taken by the Directorate of Legal Aid and Victim Services due to a valid excuse, the child is taken into custody by the directorate and, if necessary, handed over to the right holder.
- The right holder (the person with the right to establish personal relations) must notify the Directorate of Legal Aid and Victim Services in writing or through an electronic communication channel at least 48 hours before the scheduled delivery time if they intend to come and pick up the child.

- A decision may be made to implement counseling measures for the child, the right holder, and the obligated party upon the recommendation of the Directorate of Legal Aid and Victim Services to ensure the best interests of the child are met during the process of establishing personal relations.
- If decisions have been made for the right holder or the party responsible for delivery under Law No. 6284 on the Protection of Family and Prevention of Violence Against Women, including measures such as confidentiality or restraining orders, the Directorate of Legal Aid and Victim Services performs the delivery procedures in consideration of these decisions.[2]
- If the right holder (the one with the right to establish personal contact) fails to show up to pick up the child, despite notifying the Directorate of Legal Aid and Victim Services at least 48 hours in advance after the delivery order has been served to the party responsible for delivery, without justifiable reasons, twice in a row or three times in one year, the file is closed by the directorate, rendering the delivery order void. This decision is then communicated to the right holder and the party responsible for delivery (Child Protection Law, 2005: Article 41/C).

In the case where the right holder or the party responsible for delivery is serving a prison sentence or in pre-trial detention, specific arrangements are made in the legislation to ensure that the child can maintain their relationship with both parents and that the parent can fulfill their right to maintain a relationship with the child. According to the Regulation on the Enforcement of Judgments and Precautionary Measures Regarding the Delivery of the Child and Establishment of Personal Relations with the Child, "If the right holder or the party responsible for delivery is in a penal institution, the procedures are carried out through the penal institution" (Article 25/6; 32/6). This provision is considered to serve the best interests of the child by facilitating their relationship with both parents.

As stipulated by the provision added to the Child Protection Law, court orders related to the delivery of the child and the establishment of personal relations with the child will be executed at designated delivery locations determined by the Directorate of Legal Aid and Victim Services (Child Protection Law, 2005: Article 41/D). In the selection of these delivery locations, the best interests of the child are a primary consideration. Locations that are conducive to the physical and psychological development of the child are chosen. Security measures are implemented around the delivery locations to prevent potential incidents in the vicinity, with law enforcement officers taking necessary actions when required. These delivery locations are established in areas that are easily accessible to the right holders and responsible parties for the delivery while also being suitable in terms of security. Furthermore, the buildings are furnished in a manner that is appropriate for the age and developmental stage of the children, ensuring they are well-lit, spacious, and comfortable. Another crucial aspect for the centers is that the delivery locations should be equipped with the necessary technical infrastructure to record the delivery process via security cameras (Child Visitation and Personal Relationship Implementation Regulation, 2022: Article 20; 22). The regulation specifies that the selection of suitable locations for the delivery processes, as well as meeting other needs, will be carried out by the governorships and municipalities upon the request of the Directorate of Legal Aid and Victim Services. It is emphasized that public institutions and local authorities are responsible for determining the delivery locations and providing furnishings for them (Child Protection Law, 2005: Article 41/D). This regulation underscores the importance of coordinated efforts among all institutions and organizations involved in child protection.

Regarding the failure to execute judgments and precautionary measures related to the delivery of children and establishing personal relations with children, certain penalties have been specified. Those who act contrary to the delivery order for the child's delivery and those who obstruct the execution of the order may be subject to disciplinary imprisonment for up to three months upon a complaint made within one month. In cases of non-compliance with the delivery order for establishing personal relations with the child, both by those who act contrary to the order and those who obstruct its execution, upon a complaint made within one month, they may be subject to disciplinary imprisonment for a period ranging from three days to ten days. Additionally, if the rightful owner does not bring the child delivered to them for establishing personal relations to the designated location within the period specified in the court order, they may be subject to disciplinary imprisonment for up to three months upon a complaint made within one month (Child Protection Law, 2005: Article 41/F).

During the process of establishing personal relations with the child, the child may refuse to meet with the parent who is the rightful owner. According to the Regulation on the Execution of Judgments and Precautionary Measures for the Delivery of Children and the Establishment of Personal Relations with Children, in such a situation, experts are required to conduct separate interviews with the child and the parties involved. If the child

[2] According to the Regulation on the Execution of Judgments and Precautionary Measures Regarding the Delivery of Children and Establishing Personal Relations with Children, except in cases of necessity, all proceedings and transactions related to the delivery of children and the establishment of personal relations with them are conducted without bringing the parties face to face (Article 5/6).

still refuses to meet, they should record the situation along with the reasons. The expert takes into account the factors that lead to the child's reluctance and prepares a plan after meeting with the child, the rightful owner, and the obligated party within this framework, attempting to resolve identified issues. However, if the problem cannot be resolved, upon the recommendation of the Directorate of Legal Aid and Victim Services experts, a request for the implementation of counseling measures can be made to the court (Article 39; 40).

Discussion and Conclusion

In this study that evaluates the Child Visitation Centers established in Turkey since 2022, first, the number of children involved in divorce and custody cases is discussed to determine the size of the target audience the center will serve. Then, prior to the establishment of these centers, the practice of child execution in the implementation of child transfer and personal relationship establishment decisions is explained. Finally, the legal basis and institutional infrastructure of the centers are addressed, and its relationship with the Directorate of Legal Aid and Victim Services is explained. The factors that are considered to have led to the opening of Child Visitation Centers in Turkey can be listed as follows:

- In Turkey, according to the Execution and Bankruptcy Law, children were subjected to a long-standing and outdated practice of child execution. This practice negatively affected the psychosocial well-being of children and caused harm to both the child and the parents. This practice, which violated children's rights, treated children more as property to be seized and executed rather than as individuals with their own rights and needs.
- When examining divorce statistics and the number of children involved in custody disputes in Turkey, it becomes apparent that issues in the process of child custody and personal relationship establishment have become significant. In the past decade, with approximately one and a half million children becoming subjects of custody arrangements, the need for a center to provide services in child transfer and personal relationship establishment has become evident.
- The absence of any public institution acting as an intermediary and taking a role in addressing issues related to child transfer and establishing a personal relationship has made it challenging to identify and resolve problems in this area.
- Since the processes of child transfer and personal relationship establishment are not properly documented, this has resulted in disputes and allegations between the parties (the custodian and the obligor).
- Non-compliance with court decisions regarding child transfer and personal relationship establishment has led to violations of rights and hardships for both children and parents.
- Non-compliance with the planned process for child transfer and personal relationship establishment, such as the custodian not picking up the child on the specified date and time or not attending the visitation, or the custodian failing to deliver the child at the scheduled time, has led to conflicts between the parties.
- Protective and preventive orders, such as restraining orders or privacy measures, taken between couples under the Law on the Protection of Family and Prevention of Violence Against Women, have complicated the enforcement of court decisions related to child transfer and personal relationship establishment.
- The absence of a direct responsible organization for the enforcement of court decisions on personal relationship establishment has hindered both the right of incarcerated or detained parents, who are custodians, to maintain a personal relationship with their children and the children's right to maintain a relationship with their parents.

The factors that led to the establishment of Child Visitation Centers have facilitated legal regulations and the planning of institutional structures. It is considered that Child Visitation Centers will provide the following:

- Recording the processes related to child transfer and personal relationship establishment decisions through the involvement of public institutions and experts in a secure manner.
- Preventing violations of rights through sanctions ranging from disciplinary detention to a change in custody for non-compliance with child transfer and personal relationship establishment decisions.
- Carrying out professional interventions with the help of experts to identify and address the problems that may arise among the parties involved in child custody and establishing a personal relationship.
- Ensuring compliance with court decisions by parents experiencing a contentious divorce process or ongoing problems without face-to-face encounters, facilitated through public institutions and experts.

- Keeping children away from the conflicts that arise or are likely to arise between divorced parents, thus enabling expert intervention in the process.
- Ensuring the right of incarcerated or detained parents and their children to establish a personal relationship with each other.

Recommendations

There is no research in the literature regarding the problems encountered in the implementation of Child Visitation Centers. It is believed that as the institutional processes become more established, these issues will become more apparent. However, a few points can be addressed on this topic. Firstly, Child Visitation Centers can be utilized to intervene in cases where court orders related to child custody and visitation are not being followed, with the aim of addressing conflicts and problems that often arise during divorce proceedings. Given that divorce is a process marked by numerous conflicts and problems, couples are compelled to re-establish communication due to their shared responsibilities towards their children's future. Therefore, Child Visitation Centers should ideally be available to all divorced couples who request their services. Another issue is the additional workload on the experts within the Directorate of Legal Aid and Victim Services resulting from the establishment of Child Visitation Centers. The Centers will require the employment of experts, primarily social workers or social service specialists, who can operate on multiple intervention levels with children, parents, and their social circles. These professionals, including social workers, psychologists, and child development specialists, will work within the centers to facilitate the resolution of issues that may arise between children and parents. Recommendations regarding Child Visitation Centers can be outlined as follows:

- A sufficient number of social workers, psychologists, and child development specialists must be employed within Child Visitation Centers to alleviate the workload of experts at the Directorate of Legal Aid and Victim Services. This staffing increase will enhance the effectiveness of experts in Child Visitation Centers and improve the overall quality of service delivery.
- In situations where individuals involved in contested divorces or experiencing difficulties with their ex-spouse require it, they should have the right to carry out child custody and visitation arrangements through Child Visitation Centers.
- Experts or professionals who provide opinions on custody and visitation matters during divorce proceedings should also make recommendations to the court regarding whether Child Visitation Centers should be involved in implementing these decisions.
- Lastly, to promote healthy divorces and minimize the need for Child Visitation Centers, divorcing couples should be required to seek marriage counseling before finalizing their divorce.

Child Visitation Centers are essentially institutions designed to address an existing crisis. This situation can be turned into an opportunity by encouraging professionals to conduct professional work with divorcing couples, particularly those in conflict, aiming to facilitate compromise among them.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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