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Concept Mapping Plays Important Roles on Students' Critical Thinking Skills in Science

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Abstract: The lack of students' critical thinking skills especially in Science can affect the Malaysia education system. This study aimed to identify the effectiveness of Collaborative Concept Mapping (CCM) and Individual Concept Mapping (ICM) in improving students' critical thinking skills in science subjects. This study used the quasi-experimental research design that involved 189 form one students from public secondary schools in Malaysia. The manipulated variable in this study is teaching approaches, which includes Collaborative Concept Mapping (CCM), Individual Concept Mapping (ICM) and conventional method (CM). Meanwhile, the dependent variable is students' critical thinking skills in Science. Data was collected using critical thinking skills diagnostic tests and analysed using one-way ANOVA test. The one-way ANOVA indicated that the students in CCM group showed significantly higher level of critical thinking skills as compared to those in the ICM and CM groups. While, there is no significant difference in the level of critical thinking skills between students in ICM and CM groups. Therefore, CCM is effective in fostering students' critical thinking skills compare to ICM and CM teaching approaches. CCM can be used as an alternative teaching approach in science classroom to enhance students' critical thinking skills.

Keywords: Concept mapping, Collaborative concept mapping, Critical thinking skills, Science education

Introduction

Thinking skills should not only be applied to students, but it should also be an important agenda in community development in order to produce citizens who can play their role to be critical, creative, competent and responsible to the country (Curriculum Development Division, MoE, 2017; Marin & Halpern, 2011; Sarimah Kamrin & Shaharom Noordin, 2008; Economic Planning Unit, 2001). Education without prioritizing the development of thinking skills is like 'palace without pillar'. A good educational system for a country is to create a society capable of thinking and possessing universal standard intellectuals (Abdul Rahim, 1999; Elder & Paul, 2008; Sarimah Kamrin & Shaharom Noordin, 2008; Scriven & Paul, 2004).

In Malaysia, thinking skills have been introduced in the national education system since the reconstruction of the Secondary School Integrated Curriculum (KBSM) in the year of 1988 known as Critical and Creative Thinking Skills (KBKK). KBKK is still ongoing even though the country's curriculum is changing and undergoing improvement in the Secondary School Standard Curriculum (KSSM) beginning in the year of 2017. Researcher chose Critical Thinking Skills (KBK) as the main focus of the study because critical thinking skills should first be mastered by students before they can master creative thinking skills (Anderson et al., 2001; Anderson & Krathwohl, 2001; Marin & Halpern, 2011; Ghani et al., 2017; Cañas et al., 2017).

Research Background

The ability to think critically is seen by many world-class academic scholars as one of the basic requirements for educated minds (Boyd, 2001; Brookfield, 1989; Elder & Paul, 2008, 2009; Facione & Facione, 1996; Ghani et

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al., 2017; Cañas et al., 2017). Therefore, critical thinking skills are important in the teaching and learning process in the classroom so that it is in line with the expectation of the Ministry of Education Malaysia (MOE) to produce more students who understand their minds.

In addition, the importance of critical thinking skills can also be seen through the goal of KBSM science curriculum aimed at enabling students to master scientific skills and thinking skills and apply their knowledge and skills in a critical and creative way based on scientific attitudes and values in problem solving, decision making and conceptualization (Curriculum Development Division, MoE, 2011). The importance of the critical thinking skills were also outlined in the KSSM by expressing the curriculum's aspiration to create critical, creative, innovative and skillful citizens who embark on Science, Technology, Engineering and Mathematics (STEM) to achieve developed nation status (Curriculum Development Division, MoE, 2015).

Problem Statement

Science average score for Malaysia in 2015 Trends in International Mathematics and Science Study (TIMSS 2015) assessment was below the international average score guideline. Malaysia's ranking was lower than the other Asian countries. Although TIMSS 2015 recorded increasing in the Science average score which is 471 points higher than the points received in the previous TIMSS in the year of 2011 which is 426 points, it is still considered as the bottom line performance when the average score is below 500 points (Education Policy Planning and Research Division, MoE, 2016).

The weakness of Malaysian students to obtain a higher average score and a better position for Malaysia in the TIMSS is that the assessment measures the ability of students to solve problems critically rather than memorizing the facts because the cognitive domains tested in TIMSS are knowledge (30%); application (35%); and reasoning (35%). The application domains instruct students to compare, classify, use a model, connecting, interpreting information, finding solutions and to explain, while the reasoning domains instructs students to analyze, synthesize, make a hypothesis, designing, make conclusion, make generalization and last but not least is to evaluate. All these instructions are the key elements associated with critical thinking skills.

In this regard, MoE has outlined the three approaches that should be considered in handling the teaching and learning process of Science which are teaching ways to think, teaching to think and teaching about thinking. By prioritizing activities that can apply critical thinking skills in teaching and learning process, Malaysia's achievement of Science subject in TIMSS can be improved and helps students in mastering the critical thinking skills.

However, teaching of thinking skills is still poorly applied by teachers during the process of teaching and learning in Science (Sadiah Baharom, 2008; Sarimah Kamrin & Shaharom Noordin, 2008; Marin & Halpern, 2011; Leach & Good, 2011; Kamisah Osman, Wahidin & Subahan Mohd Meerah, 2013). Several studies that have proven the lack of the thinking skills in school students (Sarimah Kamrin & Shaharom Noordin, 2008; Akbariah, 2009; Fan Yan, 2015; Simon, 2013). Thus, there is a need to improve the teaching and learning Science in order to increase the level of proficient of critical thinking skills among school students (Sarimah Kamrin & Shaharom Noordin, 2008; Simon, 2013).

Therefore, teaching approach that able to address the acquisition of students' critical thinking skills in Science classroom, should be planned and implemented. The suggestion of the teaching approaches in the Science classroom are the teaching modules named Collaborative Concept Mapping (CCM) and Individual Concept Mapping (ICM).

Research Aim

This research aims to look into the effectiveness of the teaching modules: Collaborative Concept Mapping (CCM) and Individual Concept Mapping (ICM) towards increasing the level of critical thinking skills among the students in Science subject.

The research question of the study is: To what extend Collaborative Concept Map (CCM) and Individual Concept Map (ICM) teaching modules effect student's critical thinking skills in Science? Following the research questions, two null hypotheses are developed in the study:

Ho₁: There is no significant mean difference in the initial Science critical thinking skills score among students who follow the CCM, ICM and CM teaching approaches.

Ho₂: There is no significant mean difference in the final Science critical thinking skills score among students who follow the CCM, ICM and CM teaching approaches.

Literature Review

One of the ways to address the lack of students' critical thinking skills especially in science subject is to focus on teaching strategies based on the constructivism theory. (Lawson, 2001, Sadiah Baharom, 2008; Sarimah Kamrin & Shaharom Noordin, 2008; Effah Moh et al., 2013; Cañas et al., 2017). The concept mapping approach is based on constructivism (Novak & Gowin, 1984; Novak & Cañas, 2004, 2008; Harris, 2008; Bixler et al., 2015; Ghani et al., 2017; Cañas et al., 2017). In addition, concept mapping is suitable to be used in teaching and learning processes in Science with the aim to nurture and improve critical thinking skills among students.

Constructing concept maps requires systematic procedures and thus using critical thinking skills and teaching critical thinking skills to students also requires systematic procedures (Dewey, 1933, Novak & Govin, 1984; Anderson et al., 2001; Anderson & Krathwohl, 2001; Novak & Cañas, 2004; 2008; Cañas et al., 2017). In other words, concept mapping approaches can meet the need to use critical thinking skills and also meet the need to teach critical thinking skills.

Thus, the concept mapping approach is the most appropriate approach to use during the Science teaching and learning process especially with the aim of nurturing and improving students' critical thinking skills in Science. Concept mapping approach can be implemented either collaborative or individual.

Collaborative Concept Mapping (CCM) can help students build the knowledge/conceptual framework actively and train the use of critical thinking skills more frequently by structuring a large number of new information in existing knowledge/conceptual frameworks through discussions between members in a collaborative group (Quitadamo, 2000; Harris, 2008; Barchok, Too, & Ngeno, 2013). According to Gokhale (1995), exchanging ideas among members in the group is a major behavior that helps to develop critical thinking skills as conversations can stimulate students' thinking.

Individual Concept Mapping (ICM) provides an opportunity for students to take their individual time (individual pace) in building a knowledge/conceptual framework and getting autonomous in choosing what knowledge/concepts to understand about the learning topic and more open in understanding their own abilities and weaknesses (Khajavi & Ketabi, 2011).

However, very few studies have proven that concept mapping approaches are appropriate to improve student critical thinking skills (Cañas et al., 2017). Past studies are more focused on using concept mapping methods with the aim to understand the concepts of a particular science topic (Roop, 2002; Harris, 2008; Sadiah Baharoom, 2008; Gray, 2014; Fan Yan, 2015; Richbourg, 2015). Most of the previous studies that investigate the link between concept mappings with critical thinking skills had been done in areas other than Science education field (Vacek, 2009; Nirmala & Shakuntala, 2011; Bekelesky, 2015).

Methodology

This study uses the quasi-experimental design which applied a Reversed-Treatment Control Group (Shadish, Cook, & Campbell, 2002). Table1 shows the research design of the study.

Table 1. Quasi experimental design

Groups	Pre-test	Intervention	Post-test
First treatment	O ₁	X ₊	O ₂
Second treatment	O ₁	X ₋	O ₂
Control	O ₁	X ₀	O ₂

Note

O₁ : Pre-test

O₂ : Post-test

X₊ : Collaborative Concept Map (CCM)

X₋ : Individual Concept Map (ICM)

X₀ : Conventional method (CM)

This design is chosen because it has the advantage of increasing the internal validity of the study since the second treatment group acting as a "reverse effect" (Shadish, Cook, & Campbell, 2002) which may occur due to the absence of collaborative components in concept mapping interventions. "Reverse effects" may occur when part of the intervention component is eliminated which causes intervention not to affect as expected. The first treatment group is designed to study the effect of concept mapping with collaborative components on students' critical thinking skills in Science.

While, the second treatment group acts as a "reverse effect" detector (Shadish, Cook, & Campbell, 2002) and aims to control the effect of 'Hawthorne' that may exist when implementing a new intervention (Cook & Campbell, 1979; Cherry 2008; Burton, 2010). The second group used intervention of concept mapping without the collaborative components.

Sample

The population of the study was a form one students (13 years old) in public secondary schools in Malaysia. The total number of samples for this study was 189 students. Table 2 shows the profile of students involved in this study as well as the interventions provided during the teaching and learning process.

Table 2. Study samples' profile

Total Num.	Groups	Total	Class	Total	Intervention
189	First treatment	63	First	32	CCM
			treatment 1	31	
			First	31	
			treatment 2	31	
	Second treatment	62	Second	31	ICM
			treatment 1	31	
			Second	31	
			treatment 2	31	
Control	64	Control 1	30	CM	
		Control 2	34		

Students involved in the study were taken from intact classes or existing classrooms in the school as this study was conducted during regular school hours (Campbell & Stanley, 1963) so as to avoid interruptions.

Instrumentation

Data collection method was through quantitative method which is by pre-test and post-test score. Data was collected through Science Critical Thinking Skills (SCTS) diagnostic tests. The SCTS test is a Science test that embodied elements of critical thinking skills. The format of the test is based on the Form Three Assessment (PT3) requirement and are based on the Standard Document of Curriculum and Assessment of Form One (DSKP) (Ministry of Education, 2015) which consist of multi-form objective questions, limited respond questions and open respond questions (Ministry of Education, 2014). The open respond questions are the higher order thinking (HOT) questions which asking the students to analysis data, give ideas based on the correct concepts, valuing and reasoning the choice they choose and detected biased on the stated opinion or concepts.

In addition, these items are taken from form one science textbooks and reference books, and collection of actual exam questions based on the Form Three Assessment (PT3) format developed by Ministry of Education (2014). Researcher also used booklets available on the guide to form higher order thinking (HOT) questions by Ministry of Education (2014) and booklets on High-Level Thinking Skills Assessment by Ministry of Education (2013). The test was administered for CCM, ICM and CM groups before (pre –test) and after (post-test) the respective intervention was completed.

Findings and Discussion

The one-way ANOVA analysis was conducted to determine whether there is significant mean difference in the initial Science critical thinking skills score among the students who follow the CCM, ICM and CM teaching approaches. One-way ANOVA test result is shown in Table 3.

Table 3. One-way ANOVA analysis for initial Science critical thinking skills score of the students in all groups of teaching approaches

	Sum of Square	df	Mean Square	F	Sig. (p)
Between Groups	1.509	2	.754	.209	.812
Within Groups	672.819	186	3.617		
Total	674.328	188			

One-way ANOVA analysis showed that there was no significant mean difference in the initial Science critical thinking skills score among the students who follow the CCM, ICM and CM teaching approaches where, $[F(2, 186) = .209, p = .812 \text{ and } p > 0.05]$.

In conclusion, the result of this analysis showed that there was no significant difference in the mean score of initial Science critical thinking skills among students in the three groups of teaching approaches before being exposed to any intervention, hence the Ho1 Hypothesis failed to be rejected.

The one-way ANOVA analysis was conducted to determine whether there was a significant mean difference in the final Science critical thinking skills score among the students who follow the CCM, ICM and CM teaching approaches. The test's result is shown in Table 4.

Table 4. One-way ANOVA analysis for final Science critical thinking skills score of the students in all groups of teaching approaches

	Sum of Square	df	Mean Square	F	Sig. (p)
Between Groups	486.086	2	243.043	7.951	.000
Within Groups	5685.353	186	30.566		
Total	6171.439	188			

From one-way ANOVA analysis, there was a significant difference in the final Science critical thinking skills score between the three groups $[F(2, 186) = 7.951, p = .000 \text{ and } p < 0.05]$. Meanwhile, the results of the Post-Hoc Scheffe (Pallant 2011) test for the multiple comparisons of students between groups of teaching approaches summarized in Table 5.

Table 5. Post Hoc Scheffe test analysis of students between groups of teaching approaches
Dependent Variable: final critical thinking skills

(I) teaching approaches	(J) teaching approaches	mean difference (I-J)	Std. Error	Sig. (p)	95% Confidence Interval	
					Lower Bound	Upper Bound
1 CCM	2 ICM	2.966*	.989	.012	.53	5.41
	3 CM	3.705*	.981	.001	1.28	6.13
		-2.966*	.989	.001	-5.41	-.53
2 ICM	1 CCM	.739	.985	.755	-1.69	3.17
	3 CM	-3.705*	.981	.001	-6.13	-1.28
		-.739	.985	.755	-3.17	1.69
3 CM	1 CCM	2.966*	.989	.012	.53	5.41
	2 ICM	3.705*	.981	.001	1.28	6.13

*The mean difference is significant at $p = 0.05$

Based on Table 5, there was a significant difference in the mean score of the final Science critical thinking skills for the group of students who followed the CCM teaching approach with ICM $[\Delta M = 2.966, p = .012 \text{ and } p < 0.05]$ and CCM with CM $[\Delta M = 3.705, p = .001 \text{ and } p < 0.05]$, while the group of students following ICM and CM teaching approaches did not show significant mean difference in mean $[\Delta M = .739, p = .755 \text{ and } p > 0.05]$. As a result of this analysis, there was a significant difference in the mean score of the final Science critical thinking skills among students in the three groups after being intervened, hence Ho2 hypothesis was rejected.

The findings suggest that, the CCM teaching module/approach is effective in fostering students' Science critical thinking skills compare to ICM and CM teaching approaches. This is because, CCM is a combination of concept mapping learning method and collaborative learning method, making it a teaching approach that combines the advantages of both learning methods (Basque & Lavoie, 2006; Torres & Marriott, 2010).

Moreover, there is a sharing of information/ideas/concepts between students in a CCM group. This was agreed by Gokhale (1995) and also other researchers such as Bixler, et al (2015); Ghani et al. (2017); and Cañas et al. (2017) where they think, the conversation and mutual-exchange ideas between members in a collaborative group were the main behaviours that helped to foster critical thinking skills as it stimulated students to think. If there are four students in a collaborative group, then a student will receive information/ideas/concepts three times more than the students study individually.

In other words, students in the CCM group receive more information/ideas/concepts as the stimuli to think and they need to process the information they received more often compare to the students in ICM and CM groups and likely, they will think more. To assist in processing this 'vast' and 'abundant' information, students are suggested to use the concept map (Novak & Cañas, 2004, 2008; Harris, 2008; Sadiyah Baharoom, 2008; Kinchin et al., 2014 Cañas et al., 2015; Cañas et al., 2016; Cañas et al., 2017). The concept map has been widely recognized as a tool for thought (Wheeler & Collins, 2003; Novak & Cañas, 2004, 2008; Green, 2010; Rosen & Tager, 2014; Bixler et al., 2015; Cañas et al., 2016; Cañas et al., 2017; Ghani et al., 2017).

When more information is received through the sharing of information /ideas /concepts, more often cognitive skills such as critical thinking skills are used by the students to meet the demand of active learning processes (Walker, 2003; Cañas, 2004, 2008; Cañas, et al. 2012; Kinchin, 2014; Chang et al., 2016; Ghani et al., 2017). In this research, the CCM students were actively building their concept map throughout the learning process, which indirectly, the critical thinking skills are used more frequently and this we called the training of critical thinking skills. Students who practice and training more on critical thinking skills, will more easily to acquire critical thinking skills (Novak & Gowin, 1984; Novak & Cañas, 2004, 2008; Bixler et al., 2015; Cañas et al., 2017).

Conclusion

The aim of the study is to identify the effectiveness of Collaborative Concept Mapping (CCM) and Individual Concept Mapping (ICM) in improving students' critical thinking skills in Science. The study found that CCM as a teaching approach is effective in fostering students' critical thinking skills in Science compare to ICM and CM teaching approaches. Thus, CCM can be used as an alternative teaching approach in Science classroom to enhance secondary school students' critical thinking skills.

Recommendations

Even though the findings of this study showed the students' critical thinking skills in Science improved by the used of concept mapping especially the collaborative concept mapping, perhaps, this study can be enhanced and further the study by looking into details on the concept map that had been built by the students. For further research, scoring the students' concept map should be a wise option to help researcher to get the detail view on how the concept of knowledge been expended and how its impact the students' critical thinking skills in Science subject.

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A Statistical Analysis of Factors Affecting Job Performance in Public Secondary Schools and Implication in Job Security in Zamfara, Nigeria

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Abstract: The paper focus on the factor affecting public servants job performance. Specifically public secondary schools staff in Zamfara State will serve as the population. Five hundred (500) staffs will be randomly sampled from the three senatorial districts of the state. The sample comprise male and female staff and also academic and non-academic staff. Researchers developed questionnaire shall use for data collection and which will include staff bio-data, such as qualification, nature of appointment, years' experience and also items on job satisfaction and security, research questions raised will be answered using frequency count, percentages, Means and standard deviation, while the research hypothesis will be tested using chi-squares statistics and t-test statistics. Bas on the findings from the study some recommendations will be advanced from the purpose of effective job performance and security by the public staff of schools in the state and to carry out similar studies job performance using different locations and staff of the state.

Keywords: Statistical analysis, Job performance, Public, Secondary school, Job security

Introduction

It is very much obvious that the researchers have a common understanding that the quality of teaching depends on the teachers performance in our public secondary schools, therefore, performance is an important variable in any work organization (Suliman, 2001) and has become a significant indicators in measuring organizational performance in many studies (Wall et al., 2004). In that direction, many researchers have been carried out on factors affecting job performance of employees and many of the factors have been identified. These factors include staff welfare/motivation, availability of instructional material, good salary scale, management staff relationship and job security etc and these factors have been found to lead to poor job performance in teaching and learning.

Motowidlo, (2003) considered job performance to be the effectiveness of individual behaviors that contribute to organizational objectives and should consist of task performance and contextual performance. Organ (1998) further proposed that job performance should be measured to the extent to which employee engage in organizational citizenship behaviors. Sarmiento and Beale (2007) refer job performance as the result of two elements, which consist of the abilities and skills (natural or acquired) that an employee possesses, and his/her motivation to use them in order to perform a better job. According to Jex and Britt (2008), performance is oftentimes assessed in term of financial figures as well as through the combination of expected behavior and task related aspects.

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The performance of the teachers depends upon the characteristics of the teachers. These include their dedication, knowledge, and academic skills. On the other hand, there are number of factors that influence their job satisfaction. These include, working environmental conditions, terms and relationships with employers, colleagues and students, salary and remuneration, teaching-learning processes, instructional strategies and how they perform their job duties. When recruitment takes place of teachers within the educational institutions, there are certain aspects, which need to be taken into account, these include, the educational qualifications, years of experience, personality traits and effectiveness in the performance of job duties (Chamundeswari, 2013).

Motivation theories affirm the assumption that job satisfaction has something to do with the motivation required for the organization to be successful and the people involved whether in individual capacity or in group. Different theories as mentioned vary in the degree of influence between motivation, performance and job satisfaction (Revenio Jalagat, 2016).

In-service training of teachers was established to play a significant role in motivating teachers to step up their job performance since training equips teachers with the requisite knowledge and skills in the performance of specialized tasks(Ombuya H. N, 2015).

When the teachers are satisfied with all the aspects within their workplace, only then they would be able to render a significant contribution in efficiently performing their job duties. The factors that influence the performance of the teachers include, competency, teaching materials, teaching methods, monitoring the student's work, controlling the class, participation in school activities, loyalty and integrity, counsellors and guides, management and regulation, conflict resolution methods, school and classroom environment, confidence, communication skills, forbearance and acceptance, research and time management. When the teachers enthusiastically implement these factors, they are able to render an efficient job performance (Radhika Kapur, 2018).

Statement of the Problem

Job performance has been identified as the significant key for organizations to gain competitive advantage and superior productivity which is attributed to so many factors and the academic output seen to our public schools students' is not encouraging. IT is very much clear that the state public schools SSCE failure rate is high and that what motivate research, therefore, the research is to investigate the factors affecting the job performance in public secondary schools and implication in job security in Zamfara State, Nigeria for and effective teaching and learning process.

Objectives of the Study

The main aim of this research is to compare factors affecting job performance in public secondary schools and implication in job security a case of Zamfara State and specifically, the objective of the study is to:

- Analyze the staff response by gender, nature of appointment and type of job on factors affecting the job performance and security.
- Test the dependency of the research study variables
- Make recommendations for the solutions to the problems identified from the study results.

Research Questions

For the direction of the study, the following research questions are answered:

- Is there any difference in gender view on factors affecting the job performance and security?
- Is there any difference in views of staffs by nature of appointment on the factors affecting their job performance and security?
- Is there any difference in the view of staffs based on types of job on the factors affecting their job performance and security?

Research Hypothesis for Dependency Test

H_o = The job performance does not depends on job security

H_o = The job performance does not depends on staff salary

H_o = The job performance does not depends on relationship with management

H_o = The job performance does not depends on motivation

H_o = The job performance does not depend on instructional Materials/In-service training.

Methodology

Population/Sample of the Study

Staff of the public secondary schools across the state are considered as the population of the study of which stratified random sampling procedure were used by dividing the public secondary schools in three senatorial district and three local government were randomly selected such that in every local government a number as a sample staff are considered directly proportional to the population of staff of the selected schools, that constitute a random sample of 500 public school staff.

Date Collection

Questionnaire method of data collection was administrated in which 530 questionnaire of two sections A and B were distributed to selected staff and 500 were returned and that is the number used for the study. The designed structured questionnaire contains 5 variables 21 questions relevant to the research objectives.

Method of data analysis

In this research study descriptive statistics and chi square were used to identify the frequency count with percentages and dependency of the variables respectively using SPSS statistics percentage.

Reliability Test

The five hundred (500) questionnaires of 21 items that covers the research area and reliability were tested using the Cronbach Alpha coefficient as the most appropriate measure of reliability when making use of Likert scales by SPSS package (IBM SPSS Statistics 20). The result from the SPSS output gives the value of the Cronbach Alpha coefficient as 0.850 which lie between (0.70-0.90) and indicate high reliability. Below is the SPSS output:

Cronbach's Alpha	N of Items
.850	21

Results

Table 2 in the appendix, indicates that 68.4% of the respondents are Male across the state only 31.6% are Female of which 70.2% are Permanent staff while 29.8% are on contract as shown in table 3. The results of the analysis also revealed that 94.2% are teaching staff while only 5.8% are non teaching staff as indicated in table 4. As far salary in table 5, 41.2% agreed that, the right amount of salary is given while 58.8% disagreed which indicates that, the factor salary is lacking, therefore, it affect the job performance. Table 6 of same appendix, shows 67.4% agreed that in-service training motivate and enhance job performance but the results of table 7 shows that 51.4% of the respondent agreed that they are been sponsored for in-service training meaning that as

far the state in-service training in not always be a problem to job performance. 87.8% of the respondents are in the view that there exists a cordial relationship with the management hence that enhances their staff job performance as shown in table 8. Exactly 35,6% only agreed that they have responsibility allowances while 64.4% do not have responsibility allowances and that may affect their job performance and job security, hence, no motivation and is shown in table 9. 49.8% agreed that their job is not secured and they can be sack at any given time while 50.2% do not agreed for the sacking at any given time meaning that on average the respondent are of same opinion.

Decision rule for the hypotheses tested: The critical value of the chi-square at 5% level of significant is 2.353 which is less than all the calculated value of chi-square, hence all the tested hypothesis are rejected and conclude that, the job performance depends on all the identified factors as shown on table 11 of the appendix .

Conclusion

Base on the findings, the major factors affecting the job performance in the state public secondary schools are poor salary scale, staff responsibility allowances as motivation, staff cordial relationship with management and job security and also concludes that the job performance depends on all the factors (.staff salary, job security, motivation, instructional Materials/In-service training and relationship with management).

Recommendations

Considering the results of this research the following are recommended:

- The state government should look in to salary scale and improve for better take home to enable staff perform their responsibility excellently.
- Good motivation to staff by state government should be considered such as giving responsibility allowances.
- Provision of instructional material for better teaching and learning.
- Study sponsor, workshops and conferences should also be given consideration for the staff.

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Appendix

Table 2. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	342	68.4	68.4	68.4
	Female	158	31.6	31.6	100.0
	Total	500	100.0	100.0	

Table 3. Nature of appointment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Permanent	351	70.2	70.2	70.2
	Contract	149	29.8	29.8	100.0
	Total	500	100.0	100.0	

Table 4. Type of job

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Teaching	471	94.2	94.2	94.2
	Non Teaching	29	5.8	5.8	100.0
	Total	500	100.0	100.0	

Table 5. Does your employer give you right amount of salary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	71	14.2	14.2	14.2
	Agree	135	27.0	27.0	41.2
	Disagree	198	39.6	39.6	80.8
	Strongly Disagree	96	19.2	19.2	100.0
	Total	500	100.0	100.0	

Table 6. Does service training highly motivate and enhances job performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	166	33.2	33.2	33.2
	Agree	171	34.2	34.2	67.4
	Disagree	114	22.8	22.8	90.2
	Strongly Disagree	49	9.8	9.8	100.0
	Total	500	100.0	100.0	

Table 7. Does your employer/ Organization frequently sponsor in service training

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	63	12.6	12.6	12.6
Agree	194	38.8	38.8	51.4
Valid Disagree	149	29.8	29.8	81.2
Strongly Disagree	94	18.8	18.8	100.0
Total	500	100.0	100.0	

Table8. Relationship between management and staff is very cordial

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	168	33.6	33.6	33.6
Agree	271	54.2	54.2	87.8
Valid Disagree	38	7.6	7.6	95.4
Strongly Disagree	23	4.6	4.6	100.0
Total	500	100.0	100.0	

Table 9. All staff with the responsibility have responsibility allowances

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	47	9.4	9.4	9.4
Agree	131	26.2	26.2	35.6
Valid Disagree	140	28.0	28.0	63.6
Strongly Disagree	182	36.4	36.4	100.0
Total	500	100.0	100.0	

Table 10. At any given time the staff can be sacked from the services

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	76	15.2	15.2	15.2
Agree	173	34.6	34.6	49.8
Valid Disagree	170	34.0	34.0	83.8
Strongly Disagree	81	16.2	16.2	100.0
Total	500	100.0	100.0	

Table 11. Test statistics

	Does employer you amount of	your give right salary	Does training motivate enhances performance	service highly and job cordial	Relationship between management and staff is very cordial	All the responsibility have responsibility allowances	staff with I recognition as a staff of the school by the community	have high the the the
Chi-Square	73.488 ^a		77.552 ^a		329.104 ^a	76.752 ^a		270.688 ^a
df	3		3		3	3		3

The Dynamics of Intrapersonal Conflict Resolution

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Abstract: Intrapersonal conflict in the conflict analysis and resolution field is not generally a prominent focus, as there have only been sporadic approaches to preventing, analyzing, and resolving internal conflicts within individuals over the last six decades since the development of the conflict resolution field. Conflicts are usually examined from interpersonal, community, and international frameworks. However, the need for continued research and discourse of intrapersonal conflict is vital to understanding the internal factors through micro-focused lenses that can help reduce the occurrences of external conflict. Traditionally, intrapsychic conflict is frequently mentioned within academia, as the origins of analyzing internal conflicts is often commonly observed from the psychology field. However, as humanity becomes more complex, intrapersonal conflict goes beyond the mind and takes the entirety of a person into consideration. A brief review and history of intrapersonal conflict is addressed, along with several frameworks and recent approaches that can help foster resiliency and cultivate internal peace within individuals.

Keywords: Intrapersonal conflict, Conflict prevention, Conflict analysis and resolution

Brief Overview of Intrapersonal Conflict

All over the world, conflicts continue to emerge. Many resources are expended to solve these conflicts, and some even seem to become intractable, as many complex challenges over the years hinder progress for positive transformation. The need for peace education from an early age is vital to fostering youth resilience to help build a more peaceful world. Children can learn how to handle their emotions, cultivate empathy, initiate inclusion, and become compassionate individuals. Early youth programs such as Roots of Empathy and The Ripple Effect Education are beginning to gain more traction in emphasizing internal conflict mechanisms to attain inner peace. However, these skills are not taught worldwide and are urgently needed. As children continue to develop, more complex frameworks can be integrated that will help them utilize conflict prevention tools to internally facilitate their inner conflicts, which can reduce the occurrences of conflicts expanding interpersonally and beyond (Georgakopoulos, Duckworth, Silverman, & Redfering, 2017).

Despite the importance of cultivating internal peace within individuals, there is a lack of intrapersonal conflict discourse within the conflict resolution field. Reasons for the lack of research on intrapersonal conflict point to a disinterest of self-reflection in Western society (Rifkind & Picco, 2014), and a topic of research that was difficult to assess due to subjectivity concerns (Laursen, 2005). The origins of analyzing internal conflicts in modern history began initially with psychology research, where Freud (1920), Adler (1929), and Horney (1945) were some of the main contributors. Miller (1952) also developed a model in assessing the root causes of internal conflict, where varying levels of fear would indicate whether a person may approach or avoid a conflict. Practitioners in the peacebuilding field have usually recommended reviewing Freudian frameworks (e. g. Galtung, 2000; Schellenberg, 1996), to help individuals focus on self-care and cultivate internal peace. However, there are many other perspectives and future possibilities that deserve equal attention.

While internal conflict is often discussed from numerous frameworks in the psychology field (Mosak & LeFevre, 1976), there are other areas of intrapersonal conflict that should be addressed. When the conflict resolution field emerged in the late 1950s, the founding academics primarily consisted of psychologists, political scientists, and sociologists (Harty & Modell, 1991). The conflict resolution field has since expanded, and still, decades later, usage of the word “intrapersonal conflict” is continuously found in the conflict resolution field, as

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scholars are mainly addressing intrapersonal processes from a psychological perspective and not from an interdisciplinary approach (Coleman, Deutsch, & Marcus, 2014).

The need for advancing intrapersonal conflict research is vital for continued efforts in building peace, as the origins of many conflicts often begin internally within a person. Recently, a discussion on the lack of intrapersonal conflict as a subject matter in the conflict resolution field was resurrected again, urging for more frameworks in assessing intrapersonal conflict analysis and resolution (Redekop, 2014). A year later, Redekop (2015) published a more detailed book on this subject, entitled “Inner Peace Through Conflict Transformation”, which provides a deeper theoretical grounding in approaching intrapersonal dynamics. The following overview seeks to expand from the contributions of Redekop (2015) in exploring additional frameworks to the intrapersonal dimensions.

The Dynamics of Inner Conflict

In the past, internal dilemmas were often referred to as “intrapsychic” (Coleman, Deutsch, & Marcus, 2014). However, the word “intrapersonal” is vital in conflict resolution research. By using the word “intrapersonal”, the analytical possibilities expand beyond an individual’s mind, taking into account the whole person, which thus presents deeper complexities to internal conflicts (Uzor, 2003). Therefore, the need to address intrapersonal conflict is imperative to understanding the entirety of an individual and to address the root causes of conflict, which frequently begins as an intrapersonal conflict within an individual (Price, 2000; Wallach, 2004).

Intrapersonal conflict often focuses on the uncertainty of making a decision or multiple decisions, which may have several barriers and factors of attractiveness and unattractiveness (Rahim, 2010). The internal conflict may generate vertigo, an emotional state of confusion that can push and pull a person into a tense state (Shapiro, 2016). While there may be equally strong forces from two different spectrums (Lewin, 1935), there can also be additional concerns that have yet to be identified or connected to the existing internal conflict. Moreover, the uncertainty during periods of pre-decision and post-decision may elevate depending on the possibility of being able to change the decided outcome (Janis, 1959). Depending on an individual’s personal upbringing, which includes family structure, educational experiences, childhood development, environment, and culture, certain intrapersonal conflicts may continuously generate, particularly if there is a significant level of culture stress associated with the individual’s identity or perceived identity.

When an intrapersonal conflict occurs, there is often a tendency to think about the issue as problem, with the need to resolve the internal struggle in some way rather than viewing the internal conflict as a polarity or paradox (Wallach, 2004). The emotions that emerge during this time can become self-detrimental and may result in lashing out to the people around us (Rifkind & Picco, 2014). The way an individual decides to handle an internal conflict is essential for conflict management (Hocker & Wilmot, 2014). Although the internal conflict may bring with emotions which may add uncomfortable feelings surrounding the emerging intrapersonal conflict (Bodtker & Katz Jameson, 2001), there is an opportunity for reflection and growth while analyzing the internal conflict (Wallach, 2004). There is also a possibility for a person’s feelings to transform when an individual works on developing deeper empathy, when new information arises, or through the cessation of toxic habits that create barriers from learning (Hocker & Wilmot, 2014).

In many scenarios, utilizing a third party has helped resolve internal conflicts. While a third party is usually considered for interpersonal conflict, the intrapersonal perspective would be to look at yourself from a bird’s-eye view, as if you are only recently encountering who you are and can see reality from many perspectives. In many occasions, we become too absorbed in our own inner world that we cannot see from beyond the framework of reference we are working with. Thus, having different frameworks to look at internal conflicts from a variety of perspectives without the need for external support can help create resiliency. Through an individual challenging personal feelings and beliefs, possibilities in reframing the internal conflicts may emerge. Being aware of the multiple nuances behind internal conflicts can help in creating change from within, overcoming challenges, personal development, and cultivating a more resilient and deeper sense of self (Rifkind & Picco, 2014; Welwood, 1990).

Brief Review of Past and Present Intrapersonal Conflict Frameworks

In the conflict resolution field, there are a few frameworks that were introduced to analyze intrapersonal conflict and understand the inability to react when competing incompatible tendencies occur. The following overview is

not exhaustive, though rather a brief review in some frameworks more well-known in the conflict resolution field. Some of the earlier scholars in the conflict resolution field includes Boulding (1957), who mentioned that internal conflict is a factor that influences the behaviors of individuals involved in an interpersonal conflict (even causing self-hatred and disorganization in the mind). Boulding (1957) also referenced intrapersonal conflict to the paradox of Buridan's donkey, where the donkey is presented with two options at equal distance: a pile of hay, and the other, a bucket of water. The donkey is unable to decide between the two options and thus becomes incapable of making a decision and subsequently dies of thirst and hunger. The demise of the donkey represents a visual allusion to the danger of a person's mind and the perpetual intrapersonal conflicts that can continue if an individual remains indecisive.

The paradox of Buridan's donkey is also apparent in the intrapersonal conflict model that Brown (1957) developed, which focused on the reactions to stimulus manifestations. When a stimulus occurs, two varied inclinations are generated that may prompt two separate reactions, which is indicative in the classic example of whether to approach or avoid the imminent situation. Abelson (1959) also had a similar model which focused on two separate intrapersonal analysis processes: belief and action. The belief level encompasses internal processes, while the action level focuses on external responses. Galtung's (1965) conceptualization introduced the action-system model which focused on when a person has two or more incompatible objectives.

All of these frameworks help to analyze intrapersonal conflict, though there are additional methods that also go beyond these experiences. Lederach (2003) explained that intrapersonal conflicts may negatively or positively impact individuals and advocated for a personal level of conflict transformation because there are spiritual, cognitive, perceptual, and emotional dimensions that can impact a person from either wanting to attain a certain feeling or connection, to also being affected by all of these stimuli as well.

After the painful events of September 11, 2011, additional frameworks began to emerge in order to help heal trauma, such as the Strategies for Trauma Awareness and Resilience (STAR) program. The STAR program contains a strong focus on analyzing who we are as individuals and identifying the areas of trauma within ourselves that need healing. Through exploring our internal trauma we may be able to deeper explain our feelings of insecurity and struggles with identity (Yoder, 2005). The necessity in addressing trauma is critical, because internal trauma can manifest intense feelings within ourselves which can be a conscious though unsolvable internal conflict (Wurmser, 1996). In order to resolve our intrapersonal conflicts, a deep understanding of our own complexities is vital to overcoming any paralyzing barriers that may prevent us from positively transforming ourselves.

Ury (2006) also recognized the importance of intrapersonal conflict, as decades later after his pivotal publication "Getting To Yes", he decided to publish a prequel entitled "Getting To Yes With Yourself", which involves six methods to help center ourselves internally in order to resolve our intrapersonal conflicts and beyond. These steps include being able to see ourselves in our own shoes to prevent internal judgements. Secondly, it is important to develop our inner voice in order to be in touch with our needs (which may be hidden behind many layers) and take care of them. The next step is developing the ability to see the world through reframing and creating a positive outlook. Recognizing that the world can be on our side even if it may seem challenging or frightening is essential in creating internal peace within ourselves. The fourth step is remembering to stay in the present, because the past can haunt us and turn ourselves into a broken record. Through being in the present, we can focus on what we can do to make today better and set a plan for tomorrow and the future. We are then able to be compassionate with ourselves in response to external stimuli, which can allow us to be kind to the people in our lives and the people we have yet to meet. The last step focuses on giving first, because if we can learn to create a deeper value in giving, our abilities to become more appreciative receivers is possible. These steps are helpful in building a more resilient inner self, though there still may be personal complex challenges in healing from the past.

Redekop (2015) recommends reflective exercises in acknowledging the truth of the personal pain from an inner conflict that may be tormenting. Through locating the source of the negative feelings and questioning ourselves and our own needs that may not have been met, the ability to attain inner peace becomes more possible. Additional exercises include responding to writing prompts on "what do we love about ourselves" and "what do we want to change about ourselves" to attain a deeper sense of inner peace. Redekop (2015) also includes a 25 question assessment to help individuals understand their internal conflict strategies, such as denial (ignoring or denying the inner conflict), self-accommodation (degree of infatuation with yourself), self-compromise (degree of fulfilling or overcoming personal needs while trying to satisfy internal or external expectations), self-competition (criticalness of personal goals and expectations), and self-transformation (degree of personal awareness and positive growth, including intrapersonal communication and active listening skills).

There are also other experiential learning programs that have some intrapersonal conflict foundations. However, the scope of these programs goes far beyond the individual level though they are still helpful in gaining a deeper awareness of ourselves. Some of these programs include Kingian nonviolence, which similarly encourages beginning from within to find common ground, in order to build agape, a beloved community. One of the main principles of nonviolence even emphasizes for individuals to avoid internal violence of their spirits (King, 1958). Cultivating love from within is essential in order to generate messages within ourselves that create internal compassion, which in turn, will help lead us to be kinder to the people around us and the people we have yet to meet. This is further explored through the Aggression-Conciliation Model, which encourages shifting the anger away from people and focusing the frustrations on the challenging conditions (Lafayette & Jehnsen, 1995). Nonviolent communication is also strongly connected to resolving our intrapersonal conflicts, as the messages we tell ourselves can be very damaging and further create internal turmoil. Cultivating a language that is internally compassionate will help us become externally compassionate as well (Rosenberg, 2003).

Throughout the world, xenophobia continues to be an ongoing challenge, as people may fear those who may seem different than them. Corcoran (2010) encourages that building trust begins from within, and we should look inside ourselves to understand what the underlying internal dilemmas are and why we may feel afraid, which may originate from unresolved trauma. These internal manifestations may reveal underlying painful memories that can hinder us from being fully able to effectively build trust. We may also harbor prejudices and implicit biases that can be extremely difficult to pinpoint through introspection. Through going beyond our own comfort zones, the ability to challenge ourselves and begin to cultivate deeper connections with people is possible. Through the Community Trustbuilding Fellowship program offered by Initiatives of Change, the STAR program, and Kingian Nonviolence workshops (particularly in conjunction with the University of Rhode Island's Nonviolence Institute), these three experiential learning programs go beyond a traditional textbook format to begin the process of transforming from within. There are also other workshops and programs that address intrapersonal conflict, such as the Tavistock Institute and many similar conferences through more covert and overt group dynamics processes.

Nevertheless, the process of reading (or listening) to a book and working on the activities provided may help to begin resolving internal dilemmas. The exercises that Redekop (2015) presented are helpful to continue attaining inner peace. However, the challenges in understanding why certain intrapersonal conflicts may appear repetitively can take additional work, which is where autoethnography, specifically analytical autoethnography (Chang, 2008) may help to apply theories in analyzing and making meaning of the complexities that surround our internal selves. Autoethnography is generally composed of the self (auto), culture (ethno), and writing (graphy), that can help us understand ourselves which may help us understand others (Roth, 2005).

Autoethnographies can also provide a deeper understanding of our own intrapersonal conflicts, such as identity conflicts (Jones, 2013), trauma and grief (McKenzie, 2015), family disputes (Hudson, 2015), personally surviving the World Trade Center attacks on September 11, 2001 (McIntyre, 2016), and recovering from psychosis (Johnston, 2020). Autoethnographies can be a helpful and healing modality, as reflecting on who we are and the experiences we have encountered generates further awareness, which is crucial for positive transformation and overcoming severe barriers in our lives (Welwood, 1990). As autoethnography continues to gain further traction, new frameworks may further appear that can help in the process of analyzing and resolving our internal conflicts (Ciechowska, Kuszta, & Szymańska, 2019). With the rise of methodologies advocating for individual voices in research, such as autoethnography, the potentiality for intrapersonal conflict research and discourse can once again become more prominent.

Advancing Applications of Intrapersonal Conflict Resolution

Within the last decade, a specific focus on the intrapersonal level within the conflict resolution field has only received minimal attention (e.g. Mack, 2018; Redekop, 2015; Silverman, 2017). However, there is significant hope that these few publications are only the beginning of a deeper revival. The peace psychology field is closely connected to the conflict resolution field, and additional publications on personal peacefulness (e. g. Sims, Nelson, & Puopolo, 2013) are continuing to bridge these two fields together. As peace education programs continue to focus on internal conflict (Van Slyck, Nelson, Foster, & Cardella, 2019), additional tools can also be developed to continue expanding the dynamics of intrapersonal conflict analysis and resolution from an early age. In building our own resiliency, we can further attain intrapersonal peace that will in turn help build international peace.

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Survey of Secondary School Students Views in the Teaching and Learning of Mathematics in Enhancing their Entrepreneurship Opportunity in Nigeria

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Abstract: This study aimed at surveying the secondary school students' views on teaching and learning of mathematics for enhancing their entrepreneurship opportunity in Nigeria. The study were carried out in Zamfara state covering three Senatorial zones of the state. The target population is all the secondary schools in state. A sample of one thousand (1000) students which is made up of six hundred (600) male and four hundred (400) female students were randomly selected schools from the three senatorial district. Four hundred (400) samples were from the central zone while three hundred (300) samples from each north west and north south zones respectively. The design for this study is survey where three (3) research questions and three (3) hypotheses were raised to guide the study. The instruments used for the data collection is structured questionnaire. The three research questions were analysed using mean and standard deviation to answer the questions and two hypotheses were tested using t- test statistic. The results showed that male students views was better than their female counterparts. There is also significant difference between the mean of male studentsviews with female studentsin enhancing entrepreneurship opportunity.

Keywords: Students, Teaching, Math's learning, Math's, Secondary school, Entrepreneurship

Introduction

The role of mathematics plays in commercial, scientific and technological institutions for proper development of any nation and the overall acceptance of mathematics method as central to the solution of all kind of problem has highly enhanced the importance of mathematics (Galadima, 2002 in Suleiman, 2010). Mathematics consists of activities such as formation of concepts, abstraction, generalization, theorem building and problem solving which is basic to mathematics activities. Thus learning to solve problems is a primary goal of mathematics teaching in schools and an integral part of mathematics (Fakuade, 1980 in Suleiman 2010).

Okigbo and Okeke (2011) posited that, interest is an important variable in learning because when one becomes interested in an activity, one is likely to be more deeply involved in that activity. Other researchers like Prendergast (2011) and Lazarides and Ittel (2012), asserted that interest has a powerful influence on academic performance and they demonstrated the functions of interest in fostering, remembering and understanding material, and stimulating students' positive behaviour towards the topics.

Akonbowa (2005) opined that entrepreneurship is the creation of new organization and that it is the process of creating new ideas through devotion of time and efforts. Therefore, promoting entrepreneurship is an act of encouraging economic growth of the society. The process of new ideas and innovations involves much critical thinking which is one of the features or characteristics of mathematical ideology. Suleiman and Abdullahi (2015) states that a good entrepreneur should be characterized by the following; quality initiative, leadership, organizing, decisiveness, perseverance, industriousness, curiosity, self-confidence, willingness to take risks and ability to learn from mistakes made by one self or others. All of these qualities help the entrepreneur to think, analyse, solve problems and take action or decision (Suleiman and Abdullahi, 2015).

Mathematics has always been perceived as the most difficult subject in the school curriculum. Students continue to record high rate of failure in mathematics (Ajani and Papoola, 2013). A number of scholars outlined most of the factors that hinder the proper perception of mathematics content and also which leads to the constant failure of mathematics in both internal and external examination [Ebele and Abigail (2008); Ajani and Papoola (2013)]. The factors include the following:

- Dissatisfaction with the syllabus
- Experience and disposition on the part of the students
- Lack of appropriate mathematics textbook
- Lack of mathematics laboratory and its facilities
- Mathematics teachers' attitude to work
- Teachers-students relationship
- Mathematics anxiety in teaching and learning mathematics
- Students' previous experience knowledge of instruction

Kajuru and Papoola (2010) stated that effective teaching method and use of teaching aids allows students to enjoy services of ownership and direct involvement in judging the quality of students' performance in mathematics. Olayede, Adebowale and Ojo (2013) reported that teaching method of mathematics teacher is based on the students' performance in the subject. Ebele and Abigail (2008) indicated that learners' approach assist in reducing abstractedness of the subject and facilitate understanding and consequently lead to improvement in attitude and academic performance.

In Nigeria, entrepreneurship education is a gateway for self-reliant and economic development. Entrepreneurship is often defined as the process of innovating ideas to establish a living different from being employed. Othman, Othman and Ismail (2012) identified entrepreneurship as a potential catalyst for expanding economic growth and to maintain competitiveness in facing global challenges. Umar (2010) also defined entrepreneurship education as the education that provides skills acquisition in the process of providing individuals with concepts and skills to recognize opportunities that others have over looked and to have the insight, self-esteem and knowledge to act where others hesitated.

The need to teach entrepreneurship in mathematics is imperative as to which entrepreneurship in mathematics education will help equip the students in other to meet the socio-economic requirement in the world of work. It helps in orienting the students on how to be self-reliant after their stay in their respective institutions (i.e. after graduation) as they can explore the business and economic opportunities that surrounds them in order to be self-employed and also help create jobs for others.

Statement of the Problem

Students often express cold feet in understanding mathematical concepts being taught by their teachers which leads to the massive failure in both internal and external examinations. Secondary school mathematics education in Nigeria needs frequent improvement to meet the aspirations of individual and Nigeria as a nation. It was recently observed that poor performance in mathematics external examinations is on the increase (Akinsola, 2013; Ajani and Papoola, 2013). This may be due to lack of the knowledge of relevance of the subject to human day to day living especially on entrepreneur espiretion individual and the nation at large.

Purpose of the Study

Therefore the study investigated the secondary school students' views on the teaching and learning of mathematics as a pivot of enhancing entrepreneurship opportunity in Nigeria. Also the study highlighted ways in which students can learn mathematics in a serene and joyous environment.

Research Questions

The following are questions raised in line with the research topic.

1. What is the views of students in the ways mathematics is being taught at secondary school level?
2. What is the view of students on their learning of mathematics at secondary school level?
3. Do the students reliase that knowledge of mathematics can enhance their entrepreneur opportunity?

Research Hypothesis

The following hypothesis are drawn to guide the research

1. There is no significant difference in the view of male and female students on the ways mathematics is being taught at secondary school level.
2. There is no significant difference in the view of male and female students on their learning of mathematics at secondary school level.
3. There is no significant difference in the opinion of male and female students on the use of mathematics in enhancing entrepreneur opportunity.

Research Methodology

The study was a descriptive survey type. The researchers designed questionnaire which was used to collect data from the three senatorial districts. The target population comprised of six (6) randomly selected secondary schools that comprises two (2) schools from each senatorial district with a sample of 1000 students that were systematically sampled from the selected schools. The sample comprised of six hundred (600) male and four hundred (400) female students.

Research Instrument

In this research, the designed questionnaire tagged "Questionnaire on Students' views towards Mathematics in Enhancing their Entrepreneurship Opportunity in Nigeria" was used to gather the data from the students that were randomly selected from the three senatorial districts. The questionnaire comprises of twelve (12) items that sought the students' views/perceptions/interests towards the teaching and learning of mathematics as a pivot/tool in enhancing entrepreneurship opportunity in Nigeria.

Validation of the Instrument

The instrument was validated by experts in the field of Mathematics Education in Department of Science Education, Faculty of Education, Federal University Gusau to ensure that the appropriateness or otherwise of the questions in the instrument for the purpose of the research. In this way, the instrument was validated to ensure that it measures what is supposed to measure. The reliability value for the instrument is 7.21 using test re-test method.

Method of Data Collection

One thousand (1000) copies of questionnaire were administered to the students in the three senatorial districts. The questionnaire was systematically distributed to four hundred (400) samples from the central zone while three hundred (300) samples each from north west and north south zones respectively. The questionnaire was distributed by the researchers and collected the answered questionnaire immediately.

Method of Data Analysis

The three research questions generated were answered using descriptive statistics. The researchers administered 1000 copies of the questionnaire forms to the students whom participated in the research study. All administered questionnaire forms were later obtained and used for analysis.

Research Question 1

What is the views of students in the ways maths is being taught at secondary school level?

Table 1. Mean and Standard Deviation Responses of Students views on Teaching Mathematics

Gender	N	X	SD
Male	600	16,50	3.27
Female	400	15.90	2.91

From Table 1, it is clearly observed that Male students had mean score of 16.50 while the female students had a mean score of 15.90 This shows that male students views teaching of mathematics higher than the female students.

Research Hypothesis 1

1. There is no significant difference in the view of male and female students on the ways mathematics is being taught at secondary school level.

Table 2. T-test Analysis on the students view of Mathematics Teaching at Secondary School Level

Gender	N	Df	T-cal	T-critical	Remark
Male	600	998	1.28	1.96	Significant
Female	400				

Table 2 shows that the t-cal is 1.28 which lower than t-critical 1.96. consequently, the null hypothesis is rejected. There is significant difference in the view of male and female students on the ways mathematics is being taught at secondary school level.

Research Question 2

What is the view of students on their learning of mathematics at secondary school level?

Table 3. Mean and Standard Deviation Responses of Students on their learning of Mathematics

Gender	N	X	SD
Male	600	15.65	3.32
Female	400	14.45	2.77

From Table 3, it is clearly observed that Male students had mean score of 15.65 while the female students had a mean score of 14.45 This shows that male students view their learning of mathematics higher than the female students.

Research Hypothesis 2

There is no significant difference in the view of male and female students on their learning of mathematics at secondary school level

Table 4. T-test Analysis on the students view of Learning of Mathematics at Secondary School Level

Gender	N	Df	T-cal	T-critical	Remark
Male	600	998	1.58	1.96	Significant
Female	400				

Table 4 shows that the t-cal is 1.58 which lower than t-critical 1.96. consequently, the null hypothesis is rejected. There is significant difference in the view of male and female students on the ways mathematics is being taught at secondary school level.

Research Question 3

Do the students release that knowledge of mathematics can enhance their entrepreneur

There is no significant difference in the opinion of male and female students on the use of mathematics in enhancing entrepreneur opportunity.

Table 5. Mean and Standard Deviation Responses of Students on their learning of Mathematics

Gender	N	X	SD
Male	600	17.66	13.32
Female	400	16.56	12.77

From Table 5, it is clearly observed that Male students had mean score of 17.66 while the female students had a mean score of 16.56 This shows that male students view mathematics usage in enhancing entrepreneur higher than the female students performed better than the female students.

Research Hypothesis 3

There is no significant difference in the opinion of male and female students on the use of mathematics in enhancing entrepreneur opportunity.

Table 6. T-test Analysis on the view of Male and Female Students on the use of Mathematics in enhancing entrepreneur opportunity.

Gender	N	Df	T-cal	T-critical	Remark
Male	600	998	1.85	1.96	Significant
Female	400				

Table 6 shows that the t-cal is 1.85 which lower than t-critical 1.96. consequently, the null hypothesis is rejected. There is significant difference in the view of male and female students on the ways mathematics is being taught at secondary school level.

Discussion of the Findings

The results presented in table 1 and 3 clearly established the fact that Mathematics teaching at Secondary level was a significant factor in engaging students entrepreneurship at Secondary level. The table 1 shows the mean male students performed better than their counter part with 16.50 was higher than female students with 15.90, so also, table 3 indicates that the mean of male students with 15.65 was higher than those of the female students with 14.45.

To further address the problem, three null hypotheses was formulated and tested at 1.96 level of significant. Therefore, the result in table 2 shows that, with respect to the mathematics teaching at secondary school level an t-cal 1.28 was obtained, with an associated probability value of 1.96. since the t-cal was less than 1.96 level of significance probability, the null hypothesis was rejected. Thus, there was a significant difference between the male and female students.

Summary of Findings

The summary of findings of the study includes:

1. Male students produce higher mean than the female students in their views on mathematics teaching and learning.
2. There is significant difference between the mean of male students and female students in enhancing entrepreneur opportunity.

Conclusion

The study aimed at determining the secondary school students views in the teaching and learning mathematics in enhancing their entrepreneurship opportunity in Nigeria. The results obtained from the data analysis in the study, indicate that, male students views are higher than their female counter part in enhancing their entrepreneurship. teaching and learning

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The Practice of Collaborative Synergistic Leadership among Malaysian Primary School Science Head Department

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Abstract: The practice of collaborative synergistic leadership among head of the primary school science department has used descriptive quantitative design. Synergistic collaborative work is one of the ways collaboration should be practiced in primary schools to enhance teachers' ability and effectiveness of teaching and learning thus helping to boost achievement in science education. The purpose of this descriptive study was to identify the level of leadership knowledge of the collaborative synergy of the science department and to identify the level of management skills possessed in the department management practice. A total of 45 head department from primary schools in Klang district, Malaysia were selected as respondents of this study for the purpose of sampling. The questionnaire used in this study was modified from Mohd Anuar (2007) and Zainorazlin (2001) and Syek (2007) to meet the objectives of the study. The Siegle Reliability Calculator was used to analyze the study data. The results of a pilot study in 25 primary schools showed that the level of collaborative synergy leadership knowledge and management skills in the Science Department were high, yielding a .83 Cronbach alpha. As a result of this pilot study, researchers have proposed several steps to improve and improve the instrumentation and methodology of collaborative synergy leadership research in schools.

Keywords: Leadership, Collaborative synergy, Head department, Primary school

Introduction

The education world in Malaysia today has faced global and liberal challenges in managing an educational institution (Eizuan & Asmah, 2019; Ming 2006). The effectiveness of leadership and management of a school is also influenced by differences factors such as school culture, communication, decision making and more. Instructional leaders also need to build collaborative networks among head teachers, teachers, parents, the surrounding community and working with schools local, domestic or foreign (PPPM, 2013 -2025). This is a collaborative network that is a three-party or three-way partnership is known as a collaborative synergy while leadership means something leadership or management skills (Eizuan & Asmah, 2019). A combination of the two these words can be defined as the power of leadership to form partnerships and a three-way or three-party collaboration on a common goal to achieve the same vision and mission.

This study will measure the practice of collaborative synergy leadership encompasses programs of cooperation implemented by the participating schools covers planning, instructional, monitoring and evaluation / assessment. Knowledge existing collaborative synergy leadership can be interpreted through observation the interaction of head teachers with teachers in real school activities in examples; planned meetings, unplanned meetings and others on collaborative leadership practices and the role of instructional leaders (Azlin and Roselan, 2007; Rubin, 2009). This statement was reinforced by Spillaine (2006) who explains that the practice of instructional leader leadership is referring to the actions of the leader himself. Therefore, researchers want to understand how knowledge works there are instructional leaders like the chair of the science committee in leadership practice. These collaborations are being implemented to help preserve science education.

Research Background

Accordingly, the sustainability of science education has been set through the design of the Science curriculum in line with Timss's recommendations and requirements. By Therefore, it is a challenge that should be shared by everyone especially instructional leaders to improve school Science education achievement national. This includes parents and stakeholders such as the Education Center Teachers and the private sector.

In addition, primary schooling is a very complex process challenging because it involves several elements namely intellectual, interpersonal and spiritual (Richard, 2010). Therefore, primary school leadership also needs to be proficient in teaching primary school through different teaching methods and strategies from one grade to another others to meet the needs of students in each unique and unique class.

In addition, the effectiveness of a learning has been described by Reynolds and Muijs (2016) is dependent on the improvements made by leaders instructional in example, positive expectations on students' abilities, their classroom structured and systematic, emphasizing students' importance academic achievement especially in science subjects, good time management, set goals for a lesson that is taught, has a variety of teaching strategies, effective questioning methods and provide strong support to students and provide a comfortable learning environment in the classroom.

Accordingly, the Chair of the Subject Committee is the instructional leader and middle managers need to understand their leadership goals in order to recognize, understand and carry out responsibilities as curriculum managers and leaders at school more effectively. They also need to be aware of and understand that leadership is a process that interacts with individuals through one's behavior to encourage them to work towards achieving their organizational goals (Curriculum Development Center, KPM. 2001). This is the same as Shafila's statement (2008) that management of an educational organization must follow its direction has been outlined by each of those institutions. As such, the aspect of identifying collaborative leadership knowledge is synergy among instructional leaders in primary schools should be seen as a key focus to help improve professionalism among committee chairmen science that is the leader of the middle school curriculum at the national school.

Problem Statement

This study was carried out by reference to some of the findings of the previous study demonstrates the role of collaborative leadership and community sensitivity surroundings are very much needed in establishing a complex relationship at school for creating greater success in schools (Mohd Salleh Mahat, 2004). Sharing smart is a mechanism that is synergistic to all involved because school improvement and community development are interdependent each other. This is because sharing within the community around the school is for the need for schools to focus on assurance of resource needs, increasing student numbers and school finances but still less giving focus on improvement opportunities in learning especially in the subject science (Bush, 2009; Lumby, 2009).

However, the current study focuses more on the relevance of leadership collaborative with teacher relationship factors, cultural factors and teamwork factors (Shek, 2007) at a school and there is still a lack of relevant research with the study of collaborative leadership knowledge among leaders instructional such as committee chair, school and science subjects. Most studies the leadership that investigators are investigating today is more about discussion related to the role of the school principal or the headmaster as the instructional leader whereas the real need is found in the method of distribution leadership that is the driving factor in improving school performance (Day and Sammons, 2013). Spillane and Harris and others are leadership researchers previous distributors have conducted research that focuses on partnerships leadership between the headmaster and committee chair, teachers and parents or both community. As such, teamwork is a common feature in research writing management science but actually the school environment does not build the organization team based on organizational structure factors and educational career patterns hierarchical (Mohd Najib and Beng, 2011). This has given us a strong reason to researchers that such a study is necessary and appropriate implemented to bridge the knowledge gap in this area and beyond closing the existing research gap.

Further, the research of professional development of science teachers is still simple and teacher-driven science is still less active in playing a role in boosting interest students through science programs (Kubilay and Ozden, 2012). Mohamed Najib and Beng (2011) also stated that the school administration was accustomed to working team but many teachers are comfortable with the way they work. It will thwarted efforts to create a collaborative culture and partnership among teachers science.

Several steps and efforts are being made to enhance professionalism and science teacher competence through the active role of the chair of the synergy in a synergy collaborate with various parties and not just focus on school administrators and a science teacher on the committee but also includes the chair of the other school science committee at the same area or establish a network of relations with the local private sector and the surrounding community to help science teachers through smart synergy. Sharing ideas and expertise to improve school performance can be created within the community nearby schools or groups in order to produce levels creative thinking among science teachers.

However, no studies have been conducted on collaborative knowledge between principals environmental or group science committee. Lack of empirical data related to collaborative leadership knowledge among leaders the science committee has encouraged researchers to conduct quantitative research to study this level of collaborative leadership knowledge.

Previous studies have focused on collaborative management studies on comprehensive quality management, school effectiveness and even school progress (Shek, 2007). In addition, existing studies focus only on those factors influence collaborative management while Mohamed Najib and Beng's (2011) study also discusses the job satisfaction of instructional leaders in general, not specific to committee chair and science subjects.

Therefore, this study was conducted to identify the leadership practices of the chairman of the committee, especially in conducting three-way relationships or synergies collaborate between administrators and school science teachers and those in the environment as well as partnering with external (private) parties to establish a partnership can have a positive impact on their respective schools especially enhance the professionalism of science teachers and the T&L quality of teachers in the classroom.

Research Aim

The research aim is to identify the relationship of the synergy leadership practices collaborative with management skills among the chair of the science committee and the relationship of management skills among science committee chairmen with professionalism of science teachers in the T&L of science subjects.

The research question of the study is: How is the practice of collaborative leadership synergy between science leaders and management skills among science committee chairmen? What is the management skill of the chair of the science committee with science teacher professionalism in T&L science subjects?

Following the research questions, two null hypotheses are developed in the study:

Ho 1. There is no significant difference between synergy leadership practices collaborative chair of the science committee with management skills among the chair of the science committee.

Ho 2. There is no significant difference between management skills among others head of science committee with professionalism of science teacher in T&L science subject.

Literature Review

The primary education programs provided in Malaysia are of two levels Level One (Year One, Two and Three) and Level Two (Year Four, Five and Six). Basically, primary education is provided to students between the ages of 7 and 12 year is to provide a solid foundation in reading, writing, counting and measuring (4M); introduction to basic concepts of science; skills pravocational; generic skills and the application of pure values (Educational Policy National, MOE, 2012a) and the goal of lower education is in accordance with Philosophy National Education (FPK). Primary education is also fundamental to development and the development of cognitive, affective and psychomotor domains of students in line with FPK (KPM, 2012b).

Further, science education in primary school is in two stages Level One focuses on the process of building understanding, skills and applications while science Two, while Level Two aims to strengthen understanding and skills the process of science among students in order to apply the concepts of science already learned into everyday life effectively (Three Year KSSR Review, MOE, 2018). According to Sufean (2008) this level of primary education is important science knowledge to solve problems and think in logical steps and right. Thus, there are many interesting teaching and learning (T&L) methods student interest can be used by teachers to

further Science knowledge creative. In addition, at this stage students should also be encouraged to explore through the experience and knowledge generated by the teacher.

In addition, the instructional leader is also an expert in classroom teaching. Therefore, to be an instructional leader effectively, those who have been appointed must know their role as leaders instructional and knowledgeable about T&L in the classroom. In addition therefore, instructional leaders also need to develop collaborative activities with leaders other instructional tools to enable the sharing of ideas generated in the process preserving primary school science education. According to Norazlinda and Surendran (2016) teacher autonomous and collaborative practices can lead to increased teacher commitment and teachers' trust in school principals. This statement is also in line with reality Lokman and Muzammil (2008) explain that when collaborative and collaborative exists between the teacher and the chairperson of the committee will be able to increase teacher engagement and can provide the best service to the school. Both of these statements can motivate great teachers to face challenges and change demands high creativity and endurance as they carry on their tasks and a very complex responsibility to achieve Malaysia's educational goals.

Furthermore, school management and leadership skills are important for produce world-class, quality education leaders. According to Abdul Ghani et.al (2010), leadership is defined as the influence of its followers can make changes to achieve the goals of a school organization development and school performance. What Abdul Ghani e.al (2010) stated in parallel with Spillane (2006), such as leadership activities such as supervision, chairing school meetings, administration and management is a process interactions that catalyze an individual or group of people an organization (Spillane, 2006). This is because of the way collaborative leadership is leadership accordingly and this is in line with its distributive leadership cited by Spillane (2006) and Harris (2015) who also explain that distributive leadership is related to the collaboration of an organization.

In addition, Spillane and Healey (2010) and Fullan (2012) also suggest that more research on distributive studies needs to be conducted that focuses on the role of instructional leaders so that distributive leadership can be understood and further enhancing school success. The role that needs to be played by Instructional leaders such as head teachers and committee chairmen have been described by Fullan (2012) by stating that instructional leaders support their efforts teachers to collaborate with colleagues from other schools it is important to achieve the school's success and objectives. This is also supported by Freedman and Cecco (2013) in their study showed that leadership can influence the learning of the students in the school along with their attitude towards each other believe in the trust of the school community. Next, the instructional leaders (head teachers and committee chairmen) should also be prepared face the challenge of making any change in the character and spirit large (Many, 2009). This is in line with national education policy implementation measures namely, enhancing collaboration between schools and the community and the school network in example, international student networks (KPM, 2012).

Therefore, this issue should be viewed from perspective of the process of building leadership knowledge and not from a behavioral standpoint and the attitude of the headmaster and any other instructional leaders such as committee chairmen like the findings of previous studies. According to Abdul Ghani et.al (2010), the belief that characteristics leadership is a talent and its legacy must be revisited for leadership is a process that everyone can learn. Therefore, all the statements and basics raised by this researcher are possible was used as a basis for the process of measuring the level of collaborative leadership knowledge among the science committee chairmen in the primary school and subsequently evaluate the skills managing them to enhance the professionalism of science teachers in collaborative synergy in pdpc science subjects.

Methodology

This study used a survey method through a descriptive questionnaire. This method makes it easy for researchers to gather information on the level of knowledge collaborative synergy leadership and management skills among science committee chairmen on the professionalism of science teachers in the T&L of science subjects. Research method the descriptive can explain the issues related to the current status related to areas studied based on existing phenomena (Creswell, 2009).

Sample

Samples are the type of sampling used and the actual study location will be conducted in the Klang district of Selangor that will involve all the science committee leaders in the school a nation of 45 people according to

Cohen's proposal (1988) taking into account effect size, sampling error and significant level research. Based on the context of this study, the confidence level used is at 95% with a sampling error of 1.0%. Prior to conducting the actual study, the researcher first conducted a two-time pilot study of questionnaire instruments involving 25 national schools with the purpose of determining reliability and validity on the questionnaire. Reliability is a benchmark shows the consistency between the two measurements on the same thing for prove the existence of variance from the measured sample and the score of an object the instrument is stable and consistent after the same instrument is administered repeatedly on different times (Creswell, 2009).

High reliability indicates minimal variance error measurements while low reliability can result in errors large in the measurement because the statistical test cannot detect the actual difference when there is a difference. The higher the level of reliability, the higher the level confidence in the instrument to be tested. The reliability coefficient value is calculated for determine the overall quality of the instrument test. 'Cronbach's coefficient test alpha 'is used to analyze pilot study data to estimate reliability of each question component in the questionnaire.

Instrumentation

The questionnaire instrument consisted of two sections; Part 1: Background of respondents and Part 2: Schools Science Committee as effective work organizations

Part 1 contains respondents' background in terms of age, gender, status marriage, academic and test approvals, teaching options, work experience and teacher involvement in curriculum and co-curriculum. Number of questions contained in part 1 is 10 questions. Respondents should only mark (/) in the room provided. Meanwhile, section 2 contains 35 scale-related questions related to schools as an effective organization. Researchers included 7 elements in the questionnaire in this area of leadership elements, goals, communications, collaborations, problem solving, responsibility and relationship building. The results of this study will be analyzed descriptively for part 1 of the mean, median, mode and percent.

Meanwhile, part 2 researchers will analyze the t-test will use the "Siegle Reliability Calculator" Software in the Microsoft Excel application. In this study, t-tests were used to compare two-min variables independently whether it has statistically significant differences. The t-test was also used to test hypotheses 1 and 2 as shown in Table 3.1, there is no significant difference between levels of knowledge the leader of the collaborative synergy of the science committee with management skills chair of the science committee, and there are no significant differences between skills management among the chair of the science committee with the professionalism of the science teacher in T&L science subject.

Table 3.1. Hypothesis and t-test

Symbol	Hypothesis description	Test Value t
Ho 1	There was no significant difference between the leadership synergistic leadership of the science committee and the management skills of the science committee chair.	$p \leq 0.05$
Ho 2	There was no significant difference between management skills among science committee leaders and professionalism of science teachers in the T&L of science subjects.	$p \leq 0.05$

Findings and Discussion

Table 4.1. Questionnaire analysis using the Cronbach Alpha test

Instrument Section	Element	Num.Original Items	Num.items fixed	Alpha 1	Alpha 2
Section 2: Schools science committee as an effective organization	Knowledge of Leadership The goal Communication Problem solving Joint Engagement Responsibility Relationship of vision	35	5	0.80	0.86

Based on Table 4.1, Cronbach alpha calculations are used to generate coefficients reliability to determine the degree of internal consistency of the study instrument. After pilot study 1, the alpha coefficient values for the questionnaire are given in Section 2 about the school element as an effective organization is 0.80. While pilot study 2, the alpha coefficient values for the questionnaire are in Section 2 about the school science committee element as an effective organization is 0.86. Average value Cronbach alpha in this pilot study was 0.83.

The first pilot study was conducted in February 2019 involving 20 national primary schools in Malaysia. The purpose of pilot study 1 is identifying language problems and understanding the content of the instrument. The respondents of the survey were asked to state any difficulties from the questionnaire answered to ensure that a valid questionnaire was administered. Next, the researcher sit together with expert teachers and master trainers Malay to identify problems in the instrument items in terms of language and comprehension the contents of the instrument. In addition, it aims to ensure that the items in question does not contain elements that are sensitive to any of the parties involved.

Next, is to identify the time period required by the respondents survey to complete the questionnaire and the time taken by the survey respondents is within 30 minutes. This means the instrument can be completed within set time. The benefits of instrument administration in the pilot study stage 1, some items with unclear conceptual meaning have been corrected in terms of adjustments language and semantics in terms of spelling errors and sentence structure in the study instrument.

After review of each instrument item, pilot study 2 was conducted in April of 2019 involving 20 science committee chairmen at 20 primary schools. The purpose of the pilot study 2 is as one way check and balance to make sure the items in these surveys are within reach the best confidence before starting a real study. Investigators are still here consider feedback and suggestions related to the item contained in it instrument by the respondent if any.

Conclusion

This study is important to move on to the actual study stage to fill in the gaps of existing studies and to add empirical data related to collaborative leadership studies.

The pilot findings indicated that the set of instruments to be implemented at the actual study stage had a high reliability value of Cronbach alpha 0.83. Researchers have also considered the comments and improved the research instruments so that the data collected will meet the research objectives, answer the research questions and be able to reject or validate the research hypothesis more accurately.

Recommendations

Although research on leadership in collaborative synergy among science committee leaders has shown good results during the pilot study and will continue to be true, researchers are still convinced that this collaborative synergy study still has a lot to do with future researchers focusing on the relationship between collaborative synergy leadership and student academic achievement in science subjects.

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The Impact of Profitability on Environmental Disclosure of Quoted Firms in Nigeria

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Abstract: This study has focused on assessing the impact of profitability on environmental disclosure of quoted firms in Nigeria, for the year 2016. The research has been undertaken on all companies listed in the Nigeria Stock Exchange (NSE). This study examines the impact of profitability on Environmental Disclosures of quoted firms in Nigeria. The study adopts a cross-sectional research design. The study used a sample of 82 firms from the total population of 176 firms listed on the Nigeria Stock Exchange for a period of 5 years ranging from 2012 to 2016. Method of data collection was secondary data. The study employed Binary regression Logistic techniques as the method of data analysis. The findings of the study indicates that a significant relationship exist between profitability and environmental disclosures with a probability value which shows 0.0141 at 5% level of significance. Since the P-value calculated of 0.0141 is less than 5% level of significance, the study therefore rejects the null hypotheses that no relationship exists between profitability of quoted firms and environmental disclosures. The study therefore concludes that firm voluntarily disclose the effect of their operations on the environment they operate. The study recommends that government should compel companies aspiring to be listed on the Nigeria Stock Exchange to provide environmental risks disclosures as one of the pre-requisites for listing and should be enforced to continually provide such environmental disclosures while presenting their annual reports and accounts. The implication of the findings is that though the study revealed that there is a significant relationship between Environmental Disclosure and Profitability, it should be noted that in event of companies incurring losses, it will have effect on environmental disclosure.

Keywords: Environmental disclosure, Nigeria

Introduction

In recent years, the increasing popularity and significant of environmental reporting organization on the environmental disclosure seek to receive greater publicity to disclose environmental information in their annual reports due to reasons linking the demands by corporate stakeholders pressure from regulations, the power of environmental groups, the influence of competitors and multinational companies and improving corporate productivity and competitiveness (Muttanachai & Stanton, 2012). It is difficult for firms to operate in today's business world where consumers have, and require, more knowledge regarding firms' products and services, their ways of operating and about the firm itself. Consumers in today's world are more aware and wide awake when it comes to their society and environment's prosperity and how it is been treated by the firms (Khuntia, 2014). Thus, it is a huge responsibility for organizations to carry out their operations in a social and responsible manner as it not only affects the societies but also the consumer's decision on involving themselves with the specific organizations (Wu, 2014). This is where the importance of Environmental Disclosure strikes in, because if firms are unable to provide the community with a proper assessment of the measurements that they are taking towards preventing the destruction of the environment that they work in, it is likely for the society to lower their demand for the firms' services; thus in return it results in lowered firm productivity and profitability (Lindgreen, Kotler, Vanhamme and Maon, 2012).

The main essence of conducting this research is to study the impact of profitability on environmental disclosure of firms in Nigeria. This study was carried out with the reference to firms quoted on the floor of the Nigeria Stock Exchange (NSE). Environmental Disclosure was first discussed by Emerson (1844) in his study where he elaborated the importance of green marketing; it was further flourished by authors like Lepold (1940) and

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

Carson (1962), where they legitimized the concept through their publications of cultural movements (Feldman, 2007; Carson, 1962). However, the concept of Corporate Social Responsibility (CSR) was first discussed in the early 1930's (Carroll, 1999). Carroll (1999) discussed CSR as a reference to the obligations of businessmen to pursue policies, make decisions and follow series of actions which are desirable in terms of the objectives and values of the society. Additionally, the first environmental disclosure were published by organizations during the late 1980s and early 1990s; these were prepared for a range of reasons but the main driver was the requirement of disclosing toxic emissions data, especially for US companies (Bennett and James, 1999).

There is currently no regulatory requirement for Nigerian Environmental impact disclosure (EID) is an important part of the strategy to communicate to the stakeholders, and is pivotal in the greening of corporate accounting reports. Subject to the manner and system of disclosure, EID may be realized through certification of firms, products, processes or management procedures by the interested parties, or as a means of self-regulation, providing ways to check firms' achievement of board-set objectives. Although it is not unexpected that there is a noticeable variance in the level and quality of environmental disclosure across different countries (Hope, 2003), the Nigerian situation is troubling because there is very little regulation. As a result, Nigerian firms may continue to operate without a responsible level environmental disclosure, to the detriment of the broad stakeholder community. Firms do not have the incentives to provide broader information about their activities that is useful to stakeholders in making decisions (Gurvitch & Sidorova, 2012). Furthermore, a few firms, particularly, foreign multinationals may be tempted to issue standalone sustainability reports while others discloses sustainability activities randomly in some parts of their annual reports. Nevertheless, Baskin (2006) reports that the sustainable report of firms in some of the world's emerging markets (especially South Africa, Brazil, India and parts of Eastern Europe) are more standardized than those from some developed economies. China, has since 2001, enacted a stipulation that companies applying to be listed in its exchange shall show their environment-related risks in the Initial Public Offering (IPO) prospectus (Xianbing & Anbumozhi, 2009), and a government rating program was initiated across the nation to categorize corporate environmental performance into five levels, marked with five different colors to give the public an overall perception of firms' corporate environmental behavior. Deegan & Gordon (1996) found that sustainable reporting is directly related to environmental lobby groups' concerns about sustainable firm development.

There is currently no regulatory requirement for Nigerian firms to disclose their environment-related risk in, for instance, their prospectus for IPO. Similarly, there is no rating system for the categorization of firms' corporate environmental performance in Nigeria, which would have given the public an overall perception of firms' environmental behavior.

Therefore, what could be the determinants for firms who choose to disclose such environmental information especially in this business world where companies are buried with neck to neck competition, it is highly important for firms to draw Environmental disclosure for not only to track down their social performance, but also to attract more consumers towards them and survive in the market about, and thus a significant number of researches have been carried out to assess the determinants of Environmental Disclosure by Firms in several countries such as the Oil and Gas Companies in Nigeria (Ndukwe & John 2015), Public Listed Manufacturing and non-Manufacturing Companies in Nigeria (Toluwa, Okun & Ikhenade, 2015), high or low profile companies (Choi, 1999; Hackston & Milne, 1996; Patten, 1992), Manufacturing Firms in Canada (Bewley & Li, 2000), Tannery, Cement, Ceramics, Engineering, Food and Beverages sectors of Bangladesh (Ahmad, 2010).

The common and specific variables that were implied in order to assess the determinants of environmental disclosure by quoted firms in Nigeria are company size, profitability, Leverage, audit firm size (Ndukwe & John, 2015; Toluwa, Okun & Ikhenade, 2015). Moreover, majority of the researches have been conducted in the developed countries, (Hackson & Milne 1996; Adams & Hart, 1998; Connors & Gao 2009; Sharfman & Fernandoi 2008; Schneider 2010; Dye & Sridha 1995; Holthausen & Leftwich 1983; Roberts 1992 and Mgbame 2012 and few in Nigeria (Ndukwe & John, 2015 and Toluwa, Okun and Ikhenade, 2015).

As a result of the recent development of its popularity, there is still have not been many researches done in this field in Nigeria and especially not limited to nature of industry. Moreover, this research will help the community to understand the concept and importance of environmental disclosure and develop the consciousness of the significance of making their decisions based on it. It will furthermore guide researchers, who will might be willing to conduct their researches on this area, with this research's result and framework to develop the bases and foundation of their literature and further consultation.

Statement of the Research Problem

It is probable that profitability impacts on Environmental disclosure of a firm in the long run. The reporting is voluntary in Nigeria but companies are engaging in it either to enhance reputation, increase their brand visibility, show their commitment for concern on community, environmental protection or employee welfare. Environmental disclosure is becoming popular unlike in the past when companies included a general statement about community involvement in their annual reports. Studies conducted on effect of environmental disclosure on financial performance yielded either a negative, neutral or positive association thus indicating inconsistent results. In addition, many studies have focused on developed markets as opposed to emerging markets. Although some firms have committed to investments in Corporate Programs through the allocation of more resources, other companies have resisted. This could, at least in part, be because of the debate on whether a corporation should go beyond maximizing the profit of its owners as the only social responsibility of business, to being accountable for any of its actions to the environment and society. The question of what really motivates Environmental reporting becomes principal. The integration of Environmental programs in the operational strategies of companies is a new reporting practice in Nigeria but there has been increased adoption among the listed firms. However, the value of the practice is still unknown. Previous studies have focused on the effect of firms' characteristics and level of Environmental disclosure but this study employs a different approach of, considering themes of environmental disclosure and their effect on profitability. The extent to which environmental disclosure leads to improved financial performance among listed companies still remains contentious. This study therefore seeks to determine the impact of profitability on environmental disclosure of quoted firms at the NSE.

Research Objectives

To determine the relationship between the profitability of quoted firms in Nigeria and environmental disclosure.

Research Hypothesis

The study is to be guided by the following research hypothesis:

Ho1: No relationship exists between the profitability of quoted firms in Nigeria and environmental disclosure.

Literature Review

Concept of environmental disclosure

The concept of environmental disclosure reporting gained greater publicity right from the United National conference on environmental and development (UNCED) held in Rio de Janeiro in June 1992. Toluwa, Okun & Ikhenade (2015) defined environmental disclosure as an environmental management strategy to communicate with stakeholders. Environmental disclosure is as well commonly regarded as corporation social responsibility reporting (Deegan, 2002). Meanwhile, Abdul (2010) defined corporate environment disclosure as the reporting by corporate environment disclosure as the reporting by corporation on the social impact of corporate activities, the effectiveness of corporate social programs, as a way corporation's discharging of its social responsibility and the stewardship of its social.

It can also be defined as the provision of public and private information, financial and non-financial information, and quantitative and non-quantitative information regarding to the organization's management of environmental issues. This information is provided in the annual report or in any other form, most of the time a separate environmental report is issued (Gray, Kouhy & Lavers 1995). This separate environmental report is often referred to as Environmental policy report. Helpful is the World Business Council for Sustainable Development in which has provided this definition of Environment policy reports (World Business Council for Sustainable Development [WBCSD], 2002): public reports by companies to provide internal and external stakeholders with a picture of corporate position and activities on economic, environmental and social dimensions. In short, such reports attempt to describe the company's contribution toward sustainable development.

KPMG (2008) has performed an international survey of environmental reporting on the 100 largest companies by revenue from a sample of 2200 firms in 22 countries. They concluded that, nowadays, environmental

reporting is widely adopted by organizations, as the 80 percent of the world's largest company's issues stand-alone reports.

A research shows that more and more organizations decide to report environmental information to their stakeholders. In the early 1990s, Roberts (1992) concluded that, despite the majority of the companies in France, Germany, the Netherlands, Sweden and Switzerland disclose environmental information; the level of this information is low. Nevertheless, a study performed by Kolk (2003) to the 250 largest Fortune 500 companies (this data represents companies from France, Germany, Italy, Japan, the Netherlands, South Korea, Switzerland, the UK and the US) during the years 1998 to 2001, concluded that environmental reporting has increased considerably within those countries. The author also concluded that environmental reporting is applied more in the industrial sectors than in the financial sectors. The level of environmental disclosure is also depending on country specific legislation and the reporting culture of the country. The companies make more environmental disclosures in such regulated countries, especially in the USA, Canada and the UK either because environmental reporting is mandatory or because society or stakeholders demand reporting (Gray et al., 1995; Hackston & Milne, 1996). Besides the mandatory requirements to disclose environmental information, there are a variety of reasons why organizations decide to, voluntarily, disclose this information.

Environmental Disclosure in Developed Countries

The developed countries have possessed a high proportion of studies of environmental and social disclosure over the last decades, where research has been conducted in developed countries regarding environmental disclosure (Emtairah & Mont 2008; Joshi & Gao 2009). These studies have aimed to measure the disclosure of environmental information (Mitchell, Percy & McKinlay 2006), and increase the rate of information disclosure in annual reports (Frost 2007). As well as this, examining the stock market reaction in terms of discloses of pollution and expenditures of control pollution, it can also be concluded that disclosure is very different between companies in terms of expenditures. It is worth stating that the industrialized countries such as Western Europe, the USA, Canada, and Australia are mainly in the areas of environmental disclosure. These studies have focused on comparing differences in environmental disclosure in developed countries through the companies operating in those countries (Ernst & Ernst, 1978; Guthrie & Parker, 1990; Tsang, 1998). Tsang (1998) made the following comments in recent studies on social and environmental disclosure respectively: Although environmental disclosure has been the subject of substantial academic research for more than two decades, the environmental disclosure literature is dominated by empirical studies in the industrialized countries of Western Europe, the USA and Australia. Even international comparative studies of environmental disclosure have focused on analyses of the differences and similarities of environmental disclosure practices in these countries only Mitchell et.al (2006) mentioned that the first studies in Australia about environmental disclosure were by Deegan and Gordon. The findings of this study of environmental disclosure were positive but there was only 7% of the sample provided by firms. Also it concluded that environmental disclosure evolved only between 1980 and 1991. Moreover, environmental disclosure was positive with sensitive industries. In general, Australian firms tend to environmentally disclose and provide environmental information. Further, Lu (2008) suggests firms increased the level of environmental disclosure, because of the surge of environmentalism. The researchers indicated disclosure correlated with increases in social concern about environments and relationships between firm's environmental performances with kinds of industry. In Canada, (Bewley & Li 2000) mentioned that Canadian manufacturing firms tend to increase disclosure of environmental information whenever events affecting the environment have increased. In another study conducted by (Singh & Zahn, 2007) indicated that the size of firms is the dominant factor determining the extent of social and environmental disclosure practices in the oil and gas industry, while in the UK, Brammer and Pavelin (2006) states that there are differences between sectors in terms of determinants which affect disclosure decisions and there is a positive relationship between the size of the firms and the quality of environmental information.

Environmental Disclosures in Developing Countries

The developed countries have conducted most of the studies of social and environmental disclosure over the past two decades, while developing countries have had a handful of studies, in particular on the countries with emerging economies (Belal & Cooper 2011; Belal & Owen 2007; Naser . 2006; Smith, Yahya & Amiruddin 2007). The studies have been conducted in India by (Pramanik, Shil & Das 2009; Sahay 2004) and in Malaysia and Singapore by (Smith, Yahya & Amiruddin 2007 and Yusoff & Lehman 2005) and by (Choi 1999) and (Dasgupta, 2006) in Korea. it can be said that most of these studies conducted in east Asia have concluded

that environmental disclosure is inadequate as compared to developed countries and the reactions are bad toward these environmental laws.

In the context of Africa, there are few studies that have been conducted on social and environmental disclosure, such as (Savage 1994) who examined 115 firms in South Africa. This study concluded that average disclosure was a half-page. This conclusion was in 63% of the total enterprises. In another study by Kisenyi & Gray (1998) in Uganda, it was noted that the level of disclosure was low. In addition, environmental disclosure has been conducted in MNCs in a study by Disu & Gray (1998), Toluwa et.al (2015) and Ndukwe & John (2015) in Nigeria. The finding of Disu & Gray (1998) was that although there are consumer concerns about environmental disclosure, there were a quarter of companies interested to environmentally disclose from 22 firms in the sample study between 1994 and 1995.

In comparison, social and environmental research examining the Arab regions remains scant, but there some attempts. For example, Kamla (2007) examined the social and environmental disclosure in 68 firms in nine countries of Arabia's Middle East namely: Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Syria, and United Arab Emirates. In addition, Hossain & Hammami (2009) examined the effects of some characteristics of firms on levels of environmental disclosure listed in markets in Qatar. Rizk, Dixon & Woodhead (2008) investigated the social and environmental disclosure in 60 firms in the Egyptian industry sector, while in Libya and Tunisia, Ahmad (2004) and Belhaj & Damak-Ayadi (2011) examined the relationship between levels of disclosure and environmental performance through the local companies' industrial and financial sectors in Libya & Tunisia respectively. The findings of these studies suggest that the levels of disclosure are low and that this has a negative effect on environmental performance. Moreover, there are other factors that have affected environmental disclosure such as political and economic systems that have been influenced by the period of colonialism.

Environmental Disclosure in Nigeria

Nigeria, being one of the world largest producers of crude oil to some extent, has experienced some rapid economic and technological development that has, in turn brought about higher levels of education, better standards of living and greater affluence amongst Nigerians. This better economic position has also meant higher levels of education amongst its people. Consequently, of late, there appears to be increased public concern and awareness for corporate social environmental impact. This could also be due to the prominent role played by the non-governmental organizations (NGOs), such as the Green Alliance Nigeria, and the Federal Environmental Protection Agency (FEPA) of Nigeria, in lobbying for the preservation and conservation of the environment. The intense media scrutiny and coverage of environmental problems – including cases of open continuous gas flaring, environmental degradation in the Niger-Delta regions, burning, indiscriminate land and hill clearing, and toxic waste dumping- have also contributed to public concern for the detrimental effects of business operations on our natural environment. Due to this change in public concern and awareness on environmental issues, it may be the case then that companies in Nigeria must respond to such changes by providing environmental disclosures within the annual reports.

To this end, this study seeks to find out whether there is a significant relationship between firms' profitability and environmental information disclosures of the selected quoted firms.

Empirical Studies

Ingram & Frazier (1978) examined the association between the content of corporate environmental disclosure and corporate financial performance. The study was concerned with a lack of corporate social responsibility disclosures in annual reports due to their voluntary nature. The authors scored environmental disclosures in 20 pre-selected content categories along four dimensions; evidence, time, specificity, and theme.

Ingram & Frazier (1980) proxies environmental performance by a performance index devised by the Council on Economic Priorities (CEP), a non-profit organization specializing in the analysis of corporate social activities. Forty firms were selected from the 50 firms that were monitored by the CEP. Regression results indicated no association between environmental disclosure and environmental performance.

Trotman & Bradley (1981): using the content analysis technique examined the association between social sustainability reporting and characteristics of companies. Findings from the study suggest that a positive relationship exist between firms' financial leverage and the extent of voluntary disclosure.

Deegan (1994) has conducted a study on the incentives of Australian firms to provide environmental information within their annual reports voluntarily. Using a political cost framework, hypotheses were developed which link the extent of environmental disclosures with a measure of the firm's perceived effects on the environment. A sample of 197 firms was obtained from Australian Graduate School of Management annual reports file for the year 1991. The results indicate that firms which operate in industries which are perceived as environmental damaging are significantly more likely to provide positive environmental information within their annual reports than are other firms.

Sarumpaet (2005) using a sample size of 252 listed companies in Indonesia, investigated the relationship between financial performance and environmental reporting. It concluded that that financial performance had no significant relationship with environmental performance.

Brammer & Pavelin (2006) states that there are differences between sectors in terms of determinants which affect disclosure decisions and there is a positive relationship between the size of the firms and the quality of environmental information. Decision makers in firms, particularly in developed countries, play significant roles in voluntary environmental disclosure. Investors do not obtain some information if decision-makers believe that investors do not need to have information or this information is available in other sources (Cormier & Magnan, 2003). Managerial decisions in companies with regard to environmental disclosure are subject to determinants. Some researchers noted in their studies that the size of the company is one of the determinants of managerial decisions, and indicates a positive relationship between firm size and the level of environmental disclosure.

Lu (2008) suggests firms increased the level of environmental disclosure, because of the surge of environmentalism. The researchers indicated disclosure correlated with increases in social concern about environments and relationships between firm's environmental performances with kinds of industry.

Plumlee, Brown & Marshall (2009) concluded that, the financial situation of the company influences the decision of environmental disclosure. This study found that when the company's financial situation is well, the company will be more likely to provide environmental information.

Ndukwe & John (2015) using a sample companies drawn from oil and gas sectors of the Nigerian stock exchange for 2008-2013 financial years, found that there is no significant relationship between profit and corporate environmental disclosures. He therefore concludes that voluntary stance of environmental reporting has often be used as a clinche for companies to under report their effects on the environment and this is responsible for the negligence of several corporate entities with regards to corporate social and environmental reporting.

Toluwa, Okun & Ikhenade (2015). The objective of this study is to investigate the Determinants of Environmental Disclosure in Nigeria. The specific objectives therefore, are to examine the effect of industry type, leverage and firm size on environmental disclosure on a sample size of 50 companies from both manufacturing and non-manufacturing sectors. The statistical method employed was the Binary logistic panel data regression. The study revealed that industry type, firm size has positive relationship, while leverage has no significant effect on environmental disclosure.

Methodology

The study employed the cross-sectional research design and the justification for the suitability of the research design is based on the fact that several firms were observed over a period of five years (2012-2016). For the purpose of this research, data was gathered mainly through secondary sources of data collection given the fact that the study is correlation in nature and is basically attempting to establish relationship of the variables. The data was for a period of 5 years ranging from 2012-2016 and was extracted from the annual reports of the firms, NSE fact book and daily official lists of the NSE. The justification for selecting the time period above was based on the availability of data and the need to conduct a more current and up to date study.

Binary regression method was adopted as the data analysis method. Binary regressions have the objective of obtaining a functional relationship between a transformed qualitative variable called Logit or Probit and the

predictor variables which can either be quantitative or qualitative. The choice of binary regression models (Probit, or Logit regression) to relate the explanatory variables to the probability of a firm’s willingness to report environmental information was based on the limited nature of the dependent variable and the inability of the Ordinary Least Square (OLS) multiple regression model to yield reliable coefficients and inference statistics in situation where the dependent variable is binary (0 and 1). The binary regression models unlike others is based on the use of dichotomous dependent variable, in which an observation scores one(1) if it is present and zero(0) if it is otherwise. The study adopts the two widely used binary regression models (Logit and Probit). The difference in these models is based on the type of probability distribution they assume. Logistic binary regression follows a cumulative logistic probability distribution while the binary probit assumes cumulative normal distribution. Both methods were used to analyse the data, but the binary probit was chosen over the logit after conducting goodness for fitness test, and it was found to have a higher percentage of fitness, therefore the probit model was adopted.

Model Specification

The model for the study is specified thus;

$$ENVD = F(\text{PROFIT}) \dots\dots\dots (1)$$

This can be re-specified in regression form as

$$ENVD = \beta_0 + \beta_1 \text{PROFIT} + U_t \dots\dots\dots (2)$$

Where: ENVD = Environmental Disclosure

PROFIT = Profitability,

Results and Discussions

H01: No relationship exists between the profitability of quoted firms in Nigeria and environmental disclosure.

The dependent variable is Environmental Disclosure, while profitability (PROFIT) is the independent variable. The summary of the regression is presented in table 4.1 below.

Table 4.1. Summary of profitability

Variable	Coefficient	Std Err	Z- Stat	P-values
Profit	0.730878	0.297872	2.453661	0.0141

Table 4.1 reveals that the coefficient has a positive value of 0.730878, which has a significant impact on environmental disclosure on the annual reports of quoted firms in Nigeria. This reveals that profitability has significant and positive relationship with environmental disclosure. It is therefore obvious from the above results that the more profits these quoted firms make; the more likely it is for them to disclose environmental information in their annual reports. The argument therefore is that activities relating to environmental disclosures no doubt constitute a cost burden on firms. Therefore, when companies are doing well economically they could most likely have means to engage in environmental disclosures. However, when companies are not financially performing well, economic demands take precedence over social and environmental performance.

The probability value shows 0.0141 at 5% level of significance. Since the P-value calculated of 0.0141 is less than 5% level of significance, the study therefore rejects the null hypotheses that no relationship exists between profitability of quoted firms and environmental disclosures. The stated null hypothesis is therefore rejected. Based on this result, it shows that there is a positive and significant relationship between environmental disclosure by quoted firms in Nigeria and their profitability. This therefore proves that the more firms engaged in environmental disclosure, the more likely their profitability to increase.

However, the statistical significance of the variable as found above in this study seems to be in line with that of Salama (2005) and Purnomo & Widianingsih (2012), which also found a positive and significant relationship between profitability and environmental disclosure.

Conclusion and Recommendations

Environmental disclosure is a set of company's commitments to ensure that it operate in an environment that is economically, environmentally and socially sustainable whilst ensuring that a balance is maintained in respect of diverse stakeholders interests. Environmental disclosure represent a policy undertaking by organization to ensure that the effect of the company's operations on the environment in which it operates is communicated to different stakeholders in their annual reports. This has attracted so much attention over the last few decades with the continual agitation of the effect of company's operations on the environments where they are located and specific example is the Niger-Delta situation. Owners of businesses through their representative i.e. managers need to compare the cost associated with disclosing environmental information and the benefits expected to accrue also to the organization. The study was conducted in order to provide an insight into the impact of profitability on environmental disclosures of quoted firms in Nigeria.

In view of this, profitability impact positively and significantly on the decision to disclose environmental information by quoted firms in their annual reports and the result was also significant at 5% because the p-value was less than 5%.

Based on the above, the following are recommended by the study:

1. The non-compulsion by law for firms to disclose the effects of their companies operation on the environment has made firms to disclose little or no environmental information in their annual reports to affected stakeholders. In view of this, the study suggest that government should come up with an incentive as a way of motivating firms for disclosing environmental information in Nigeria.
2. Also, Disclosure of environmental information should be listed as one of the pre-requisite for the listing of firms on the Nigeria Stock Exchange as applicable in other developed nations. Therefore, Government through the Corporate Affairs Commission should ensure that this is strictly comply with by prospective listed or quoted firms.
3. There is the need for firms and entities to improve in their efforts and decision to disclose the environmental risks of their operations and also the impact of such operations on the environment. Therefore, managers of organizations are advised to communicate the effect of their operations on the environment to interested stakeholders in their annual reports, because this could lead to increase in the profitability of the firm.

Conclusion

The study aimed at determining the secondary school students views in the teaching and learning mathematics in enchancing their entrepreneurship opportunity in Nigeria. The results obtained from the data analysis in the study, indicate that, male students views are higher than their female counter part in enchancing their entrepreneurship. teaching and learning

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Examining Primary School Teachers' 21st Century Teacher and Learner Skills

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Abstract: In the 21st century, where knowledge has rapidly increased and changed, social order and individual needs are also rapidly changing. However, new jobs and professions are emerging. The ability of countries to keep up with this new formation depends on their training of human potential as individuals who can meet the professional needs of the new century. This will be possible by implementing 21st century skills training programs, which are expected to meet the needs of the new century. The most important task here belongs to the teachers who will apply these training programs. For this reason, for the 21st century skills to be gained to the students, teachers with these skills must be trained first. In this direction, the aim of the research is to examine the level of pre-service teachers who will be both learners and teachers of the 21st century and to determine whether the level of possession of these skills differs according to gender and class variables. The research was done with relational screening model. The universe of the research consists of 2nd, 3rd, and 4th year students of İnönü University Faculty of Education Class Teaching in the 2019-2020 academic year. It is aimed to reach the entire universe. Mann Whitney U and Kruskal-Wallis H Test were used for data analysis. 21st century teacher skills scale and 21st century learner skills scale developed by Göksün (2016) were used as data collection tools. As a result of the research, there was a significant difference in autonomous, managerial, productive, and flexible teaching skills according to gender and grade level.

Keywords: Social studies teacher candidate, Teacher skills, Learner skills, 21st Century skills

Introduction

Mankind has struggled with the difficulties he has faced to continue his life by showing many changes and developments in every field, from the hunting society to the agricultural society, from the industrial society to the information society we live in (Tuğluk, 2019; Hotaman, 2019). During this struggle, it is seen that there are some changes in the skills and behaviors of individuals in different social processes (Özçelik & Eke, 2019). In the 19th and 20th century, individuals are expected to be effective, fast, honest, fair, hardworking, who can get along well with others (Hamarat, 2019), as well as creativity, critical thinking, problem solving, decision making, communication and cooperation, information and They are expected to grow up as people with “soft skills” such as communication technologies, information literacy (Yılmaz, 2016) (MEB, 2018).

The ability of countries to keep up with the rapid changes in the social field, economy and technology under the influence of the 21st century depends on their ability to raise their human potential in accordance with the requirements of the age (Yılmaz, 2016). At this point, lessons aiming to raise individuals as qualified and effective citizens with the skills required by the age are of great importance in defining and gaining 21st century skills (Bayır, 2016). 21st century skills express the characteristics that individuals must possess and develop continuously in order to be effective, productive and qualified in our age (Hamarat, 2019).

The most important task of equipping 21st century learners with the skills of the century we live in and raising them as individuals who use these skills for the benefit of humanity falls on 21st century teachers (Göksün, 2016; MEB, 2018). It is not that they want to present the information expected from today's teachers as a

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package and memorize them, but be educators who prepare them for the global world based on real life, work and developing technology (Ekici, 2017). It is thought that this technology should be applied in all lifetimes, especially in educational environments, as it is individuals who are grown in technology culture as well as using traditional education methods in the training of 21st century learners who are defined as “digital native” and spend most of their time with information technology tools (Prensky, 2001; Günüş, 2013; Bozkurt & Çakır, 2016).

With the change in the qualities of the 21st century learner and teacher, the old school paradigm has also changed; In addition to teaching information in schools, it is aimed to raise students with sound characters and skills such as problem solving, critical thinking, communication and cooperation (Yalçın, 2018). This is thought to be possible through the use of advanced technologies integrated into schools, classroom environments in which online and traditional learning are harmonized, personalized teaching plans considering individual differences, problem-based learning, project-based learning, flexible learning, creation workshops and portfolio evaluation. (Yılmaz, 2016).

21st century learning, defined by many influential institutions, is an effective concept in determining educational policies and exercises in most regions (Bernhardt, 2015). In line with the 21st century learning and 21st century skills in the Turkish Education System, it will facilitate the acquisition of skills required by the new age in schools within the scope of 2023 Education Vision; provide science, art, sports and culture-oriented studies; It was decided to open design-skill workshops at primary, secondary and high school levels, where design and production will be at the forefront rather than having knowledge (MEB, 2018).

Various skill frameworks have been developed in several countries, especially in the United States, by some institutions and organizations, which indicate the learning content and stages of the new millennium as part of their corporate brand (Dede, 2009). The aim of these frameworks is to explain with which skills the individuals to be raised in the 21st century world should be equipped. World Economic Forum (WEF), Organization for Economic Development and Cooperation (OECD), International Education Standards Association (ISTE), implemented in 21 states and 33 institutions in the United States and supported by the participation of many educators and business people. Century Partnership "(P-21) from the project, Turkey Qualifications Framework and described by many researchers consider in the 21st century skills although in different groupings also shows that many of the skills mentioned similar content.

In the researches, it was stated that the students did not really graduate in schools ready for business life, and the 21st century skills that children should have in the future were named as knowledge and skills generation. These skills are; learning and innovation skills, digital literacy skills, life and career skills are addressed in three main groups and each group is covered in many subtitles (Trilling & Fadel, 2009). In parallel with this, within the framework of P-21 learning, the skills in this learning zone are based on various key issues. Accordingly, some interdisciplinary themes have been created. These themes are shaped on four basic frameworks (P21, 2019).

Wagner (2008) defined 21st century skills as “survival skills”. He examined these skills under seven headings: critical thinking and problem solving, agile intelligence and adaptation, entrepreneurship and initiative, effective oral and written communication, cooperation and leadership, curiosity and imagination, accessing and analyzing information.

International Education Standards Association (ISTE) emphasized the importance of technology in defining 21st century skills. Students who are competent in reaching their learning goals, digital citizens who know the responsibilities of living, learning and working in a world connected with digital networks, knowledge making using meaningful digital tools, innovative designer who uses technology in problem identification and solving, understand the problems in a way that increases the effect of technological developments and computational thinker who develops solution strategies, creative communicator who communicates using digital platforms that meet their goals, and global collaborators who work effectively with other teammates explained under seven topics (International Society for Technology in Education., 2016).

Turkey Qualifications Framework in the "Key Competences for Lifelong Learning" have been identified. These are explained as communication in mother tongue, communication in foreign languages, mathematical competence and basic competencies in science / technology, digital competence, learning to learn, social and civic competencies, taking initiative and entrepreneurship, cultural awareness and expression. European Qualifications Framework in parallel with the development of the education with these competencies, the expansion of lifelong learning, the social life of individuals and aims to experiencing the appropriate changes to the expectations of the business world (Turkey Qualifications Framework, 2015).

The Organization for Economic Development and Cooperation (OECD) explained the skills that the learners of the new millennium should have in the 2030s as “transformative competencies” in the project named “Selection and Definition of Competencies” (DeSeCo). OECD has addressed them under three main headings: knowledge, skills, attitude, and values. In addition, these competencies have been compared to a directional “learning compass” system with a strong structure consisting of family, teacher, peer and society (OECD, 2018).

Teachers have the greatest responsibility in gaining the 21st century skills defined by different institutions and organizations and various researchers to the learners of the new millennium. Accordingly, in order for teachers to transfer their new century skills to their students, they must first be trained as teachers with these skills. 21st century teacher skills were handled under three main headings as “professional knowledge”, “professional skill”, “attitude and values” as a result of the updates made by the Ministry of National Education (MEB) regarding the profession of teaching profession. Professional knowledge; field knowledge, field education information and legislation knowledge. Professional skill; He considered education and training as planning, creating learning environments, managing learning and teaching process, measuring and evaluating. On the other hand, he explained attitudes and values as national, spiritual and universal values, approach to students, communication and cooperation, personal and professional development (MEB, 2017).

The International Education Standards Association [ISTE]) named the skills that teachers should have in the 21st century as ISTE Standards. He defined the teachers who should have these standards as follows.

- Using technology to facilitate students' learning,
- Supporting and improving the success of its students and leading them in this process
- Being a digital citizen that will enable students to be active in the digital world,
- Designing original classroom environments considering individual differences,
- Collaborating with both students and colleagues,
- Analyst individuals who facilitate learning with technology and can use and analyze the data they have in order to reach their students' learning goals (ISTE (International Society for Technology in Education), 2016).

Lemov (2010) addresses the competencies required for effective teaching under seven main headings. These; explained high academic expectations, planning that provides academic success, structuring and presenting lessons, ensuring student participation in the lesson, creating a strong class culture, creating and maintaining high behavioral expectations, and structuring character and integrity.

The aim of this study is to examine the level of pre-service teachers who will be both learners and teachers of the 21st century and to determine whether the level of possession of these skills differs according to gender and class variables.

Method

Relational screening model was used in this research. Screening research is a research model that aims to describe a situation that exists in the past or already (Karasar, 2016). In addition, screening research enables the determination of the relationships and the guesswork of the researcher. The aim is to understand the current situation and interpret it better. Studies that examine relationships and connections are called relational studies (Büyükoztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2010). The universe of the research is 2. and 3. and 4th grade students. Since it was aimed to reach the entire universe, sampling was not made. All students studying were reached and 198 scales with sufficient conditions were evaluated. In the research, the data were developed by Göksün (2016) “21. Century Teacher and Learning Skills Use Scale”. Since the data set does not show normal distribution, Mann-Whitney U Test was used for two-category variables and Kruskal-Wallis H Test was used for three-category variables.

Results and Discussion

Table 1. Mann-Whitney U Test Results of 21st Century Learner Skills by Gender

Skill Area	Gender	n	Mean Rank	Sum of Ranks	U	p
Cognitive	Female	137	98,79	13534,50	4081	,794
	Male	61	101,09	6166,50		
Autonomous	Female	137	91,44	12527,00	3074	,003
	Male	61	117,61	7174,00		
Cooperation and Flexibility	Female	137	96,14	13171,00	3718	,215
	Male	61	107,05	6530,00		
Innovativeness	Female	137	95,61	13098,50	3645	,145
	Male	61	108,24	6602,50		

In Table 1, it is seen that there is no significant difference in terms of cognitive, collaboration and flexibility, innovation skills sub-dimensions of 21st century learner teacher candidates in terms of gender, and there is a significant difference in terms of gender in autonomous skills. It is seen that this differentiation is in favor of male candidates. The differentiation of autonomous skills in favor of male candidates can be interpreted as an indication that male candidates have higher learning skills than female candidates, are aware of their own learning paths, and have higher self-confidence and self-control. In addition, due to the family structure of the Turkish society, it may be possible for male teacher candidates to use their autonomous skills at a higher level because they think that they should have a profession in order to care for their families and to be more autonomous with the responsibility they require. This indicator highlights attitudes of Turkey's dad in certain areas of economic weakness, the girl in the children's homes, support the view that jobs should help their mother. It can be said that even if the girls who grew up in the family environment where these thoughts are dominant continue their education life, they may feel more inadequate in terms of learning and personal autonomy than men. Douvan and Adelson (Açıkgenç at all., 2011) stated that the most important reason for individuals to have autonomous features is the family environment in which they grow up. This result shows that the socio-economic characteristics of the family have an important effect on the individual's attitudes, values and behaviors.

Table 2. Mann-Whitney U Test Results of 21st Century Teacher Skills by Gender

Skill Area	Gender	n	Mean Rank	Sum of Ranks	U	p
Management	Female	137	104,25	14282,00	3528	,080
	Male	61	88,84	5419,00		
Techno Pedagogical	Female	137	98,70	13522,50	4069	,769
	Male	61	101,29	6178,50		
Approval	Female	137	103,68	14203,50	3606	,089
	Male	61	90,12	5497,50		
Productional	Female	137	103,19	14137,50	3672	,160
	Male	61	91,20	5563,50		
Flexible Teaching	Female	137	97,08	13299,50	3846	,363
	Male	61	104,94	6401,50		

In Table 2, it is seen that there is no significant gender difference in the 21st century teacher skills sub-dimensions of managerial, technopedagogical, authoritative, productive and flexible teaching skills of classroom teacher candidates.

Table 3. Kruskal-Wallis H Test Results According to Class Level of 21st Century Learner Skills

Skill Area	Grade Level	n	Mean Rank	Sd	χ^2	P	Significant Difference
Cognitive	2	65	97,73				
	3	62	98,75	,42060	,185	,912	
	4	71	101,77				
Autonomous	2	65	83,98				
	3	62	97,63	,60625	10,340	,006	
	4	71	115,35				
Cooperation and Flexibility	2	65	97,76				
	3	62	97,53	,73037	,372	,830	
	4	71	102,81				
Innovativeness	2	65	89,01				
	3	62	101,72	,84249	3,677	,159	
	4	71	107,17				

As it can be seen in Table 3, there is no significant difference in grade levels of classroom teacher candidates in the cognitive, cooperative and flexibility skills of 21st century learner. There is a significant differentiation in the field of autonomous skill. This differentiation is in favor of 4th grade between 2nd and 4th grades. The fact that autonomous skills include skills such as independent thinking, coping with problems alone, and choosing to work independently in group work can be interpreted as pre-service teachers who have higher self-confidence and more autonomous personality than 2nd grade teacher candidates. The statement that Pavia (2005) 's social, economic and educational environments in which learners are involved in the development of autonomous learning skills is effective supports this interpretation. Accordingly, the fact that 4th grade students are in the university environment in a period of more than the 2nd grade can be shown as the reason for 4th grade pre-service teachers to use higher levels of autonomous learning skills.

Table 4. Kruskal-Wallis H Test Results According to Class Level of 21st Century Teacher Skills

Skill Area	Grade Level	n	Mean Rank	Sd	χ^2	P	Significant Difference
Management	2	65	115,48				
	3	62	92,26	,48876	7,571	,023	2-4
	4	71	91,19				
Techno Pedagogical	2	65	102,94				
	3	62	94,21	,50318	,815	,665	
	4	71	100,97				
Approval	2	65	105,65				
	3	62	103,38	,43066	3,427	,180	
	4	71	90,49				
Productional	2	65	110,28				
	3	62	103,72	1,57917	7,068	,029	2-4
	4	71	85,95				
Flexible Teaching	2	65	119,01				
	3	62	91,31	,84777	11,759	,003	2-3,4
	4	71	88,80				

There is no significant difference in grade levels of the 21st century teacher skills of the primary school teacher candidates in technopedagogical and authoritative skills sub-dimensions. In the area of flexible teaching, there is a significant difference between 2nd grade and 3rd and 4th grades. This differentiation is in favor of 2nd graders. According to the findings of the research, it is seen that the pre-service teachers' use of flexible teaching skills in upper classes decreased. Flexible teaching skills can be explained as the active use of these activities in the process of organizing, learning and teaching teachers' out-of-class learning activities. The fact that the results are in favor of the 2nd grade can be interpreted as the intensive theoretical knowledge included in the program in the first years of the undergraduate education caused the use of this skill area to be high, leading to a decrease in their perceptions towards flexible teaching skills depending on the practical lessons taken in the 3rd and 4th grades.

In the sub-dimension of managerial skills, a differentiation was found between the 2nd and 4th grades. This differentiation is in favor of 2nd graders. Managerial skills refer to skills related to teachers' teaching process. This situation may be due to the fact that 2nd grade teacher candidates perceive classroom management more

easily due to not taking practical courses. Class 4 candidates' being active in the learning-teaching process due to applied lessons and being aware of the difficulties in classroom management may cause them to realize that the process is not as easy and perceive themselves insufficiently in managerial skills.

Conclusion and Recommendations

The fact that elementary teacher candidates' use of autonomous skills, which is the sub-skill area of 21st century learner skills, differs in favor of male candidates, may show that female candidates need personal development support in terms of attitudes and values such as self-confidence, autonomy and self-control. Therefore, in order to minimize the differentiation between female and male teacher candidates in terms of autonomous skills, necessary support can be provided in the undergraduate education process for female candidates.

It has been observed that the level of use of flexible teaching skills, which is the sub-skill area of 21st century teacher skills, decreases as the grade level increases. This situation may indicate the decline in pre-service teachers' attitudes towards organizing teaching and learning activities outside the classroom. In this regard, we can conclude that teacher candidates will remain passive in organizing out-of-class educational activities after starting the profession. In line with the 2023 educational vision, the Ministry of National Education emphasizes that schools should cooperate with museums, universities, science centers, culture and arts centers and technoparks around it. Therefore, it is of great importance that 21st century teachers have high levels of flexible teaching skills. In order to increase the level of use of flexible teaching skills, which decreases gradually according to the grade level of teacher candidates, the applications in this direction can be increased by noting the importance of out-of-school education activities.

The differentiation of the use of administrative skills, which is one of the sub-dimensions of 21st century teacher skills of the pre-service teachers, in favor of the 2nd grade, and the inversely proportional change of the use levels of this skill in the first years of the undergraduate education of the teacher candidates, started with a high level of perception and more idealistic thoughts. This can be interpreted as their idealism decreases as they approach. In order for the elementary teacher candidates to have effective classroom management skills and to use these skills actively in the process, it may be suggested to increase the classroom management courses in the undergraduate programs, especially in the field of application.

The decrease in the level of pre-service teachers' productive skills, which is one of the sub-dimensions of 21st century teacher skills, shows that applied education is important in training teachers. In order to keep the productive skill perceptions of pre-service teachers in upper classes, they can be developed to develop their own teaching materials to be used in practice lessons.

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A Study on Gender and Age Classification as the Two Most Vital Tools in the Identification and Verification System

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Abstract: Gender identification and age classification is one of the challenging aspect in biometric authentication and verification system which capture walk from far distance and study physical information of the subject such as gender, race and emotional state of the subject. It was established that most of the gender identification methods have focused only with frontal pose of diverse human subject, image size and type of database used in the procedure. Different feature extraction process such as, Principal Component Analysis (PCA) and Local Directional Pattern (LDP) that are used to extract the authentication features of a person will also be classified in this study. The aims of this paper, is to analyze the different gender classification methods and age estimation framework in computer vision that help in evaluating strength and weakness of existing gender identification algorithm. Hence, a new gender classification algorithm will be develop with less computational cost and accuracy. An overview as well as classification of various gender identification methods will be presented first and then compared with other existing human identification system by means of their performance.

Keywords: Aging pattern, Feature selection, Feature extraction, Human identification system, Gender classification methods

Introduction

There are many applications such as monitoring, surveillance, commercial profiling and human computer interaction which benefits from reliable approaches for gathering age and gender of users. Such applications exist through a wide array of fields, from personalized advertising to law enforcement to reputation management. With the development of the recent technology, every individual requires security, accuracy and privacy in all aspects of his daily activities, where accuracy of any identification and verification system of human is one of the basic requirements for any biometric authentication system. Some of the wide range of application in which gender identification and classification techniques are very much essential includes; surveillance and security system, real time electronic marketing, biometric authentication, demographic information collection, marketing research, criminology, and augmented reality in social network. An effective gender identification algorithm can boot the overall performance of entire system, which involves feature detection and gender identification of individual subject parameter. Human face can be one of the subject parameter which provides most important visual information that can reveal a wide variety of information, whether identity, age, gender, race etc. These basic attributes like age and gender play fundamental roles in our day to day lives. Facial information differs from person to person, still human can determine the gender and age of the person just by a simple inspection of their face, and on the other hand to accomplish the same task computationally by analysis of human facial image is a challenging one for computer system. As it requires extraction of distinct features and attributes from the persons face image to classify them as 'male' or 'female' of age group as 'child', 'teenage', 'mid-age' or 'senior-citizen'. Thus, enabling a computer system to discriminate the face images on the basis of gender and age of the person is yet to be a challenging task. The two most common feature extraction processes used to extract functional parameters in gender identification methods are; principal Component Analysis (PCA) and Linear Discriminate Analysis (LDA). LDA is used to obtain discriminate features of a subject, which maximize the difference between classes of information. In addition, LDA feature extraction process is built on the variance rather than resemblances of information and the total number of discriminate feature. In PCA, to capture the direction of maximum variance that helps in

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reducing the amount of noise in gender identification method a set of mutually orthogonal basis function is used. The extracted features for gender identification, are given to classifier algorithm such as Adaboost, multilayer Neural Network (NN), Radial Basis Function (RBF) and Support Vector Machine (SVM) [1]. A research of comparison was carried out by Makinen and Raisamo [2] on the performance of several classifier algorithms in gender identification process and it was found that SVM classifier has achieved the better performance.

The performance of gender classification techniques also depend on the type of database and quality of the image. Some of the common database used for gender identification/classification process are FERET, FRGCv2, LFW, IRIP, CASIA dataset B. It is evident from the literature that, regular frontal image of a person used in gender classification process has reach maximum efficiency and accuracy.

An image fusion process was proposed by selecting different spatial scale features with mutual information Juna and Claudio [3]. The image fusion has used the histogram of LBP, intensity and shape in gender identification process. The proposed technique is analyzed using FERET database with 1009 images of size (64 x 72) and UND database with 487 frontal images of size (20 x 20, 36 x 36, 128 x 128). Another technique of gender identification algorithm with mixture of experts to classification of gender, ethnic origin and pose of a human faces was proposed Srinivas Gutta et al. [4].

Table 2 characterizes different database available for gender identification and the total number of images in each database. A complete overview of different gender classification methods will be the aim of this study with emphasis on advantages and disadvantages and the comparative study of various gender classification methods that helps in identifying good classification process. The analysis will also highlights some of the factors such as, feature extraction method used in each process with restricted database and parameters taken into account for gender identifying process. The above analysis helps in inspiring us to develop a system with maximum accuracy and efficiency.

Literature Review

This section describes an extensive review of the research undertaken in the domain related to different existing gender classification methods along with feature selection and extraction process in different database. A new age estimation approach considering the intrinsic factors of human ages has been proposed by Wei-Lun, JunZua and Jian-Jiun [5]. They presented an age-oriented local regression algorithm called KNN-SVR to capture the complicated facial aging process over the most widely used FG-NET aging database. The proposed approach achieves the lowest mean absolute error (MAE) against the state-of-art algorithms under several experimental settings. A gender classification by fusing different spatial scale features obtained from mutual information, intensity and shape has been proposed by Juan et al. [2]. Intensity feature was extracted from each pixel in the gray image and shape feature is also extracted by edge histogram of horizontal and vertical edge map. Additionally, texture features was extracted by mutual information obtained from different measurement such as mRMR, NMIFS, CMIFS and CMIM. The investigation results ensure that FERET are found to be better than other two databases (UND and LFW) and it also depends on face image quality. A gender classification via lips: static and dynamic features was proposed before [6]. The authors compares the performance of the mouth, chin, nose, eyes, full-face and inner/outer faces of still images obtained from the FERET and XM2VTS database to design an automatic speech recognition system of unknown individuals. Lip modeling framework based on GMM and DCT gave more information about appearance and dynamics features of male and female image. The experimental result of the above process has attained 100% accuracy. The major constraint such as conditional pose and change in speaker pose is also demonstrated. An algorithm based on human gait skeleton gender classification was proposed by using class B of Chinese Academy of Science dataset (CASIC B) [7]. The technique use 2D human gait skeleton walking model and it also calculated joint angle values at major points of human parts, i.e. difference between left and right legs and obtained 85.33% classification accuracy. This was found to be good in analyzing five different features of human gait. In previous literature, a multi-scale Independent Component Analysis (ICA) texture pattern for automatic gender recognition system was presented [8]. In this process, each individual face image will be analyze and it is encoded by sorting the responses obtained from ICA filter. However, the non-overlapping sub-regions histogram of the encoded image is fused into single histogram to enhance feature extraction process. This experiment has created better results with Sparse Classification (SC). A geometric based 3D gender classification technique was proposed by earlier researchers [9, 10]. The facial image obtained by laser scanning is subjected to radial and iso-level curves are used to study face image shape. The radial curve is used to locate upper part of the face and iso- level curve is used to cover the central strip of the face which is used to compute similarities between male and female template. After finding the similarity, the method used a machine learning algorithm, which includes adaboost,

neural network and SVM to attain maximum accuracy and efficiency. The process used FRGCv2 dataset of different subject and produced 84.98% classification accuracy. But, it fails to explain about ethnicity and facial expression. A gender recognition using 3D human body shape was developed [11]. The method have used different machine learning algorithm to analyze breast regions of human body that helps in identifying male or female subject. On the other hand, SVM is used for gender classification and to produced maximum accuracy in geometric 3D gender classification. Maodi Hu.et al. [12] have presented a gait-based gender classification with Mixed Conditional Random Field (MCRF). The method explains about shape, appearance and temporal dynamics of both genders are given to a sequential model to extract major feature of the subject. In temporal part, neighborhood preserving embedding scheme is clustered to allocate the stance indexed over gait cycle and in shape descriptor part, ellipse fit parameters are used. Further, by fusing temporal and shape descriptor part the process has attained better classification mechanism. Srinivas Gutta et al. [13] have proposed a mixture of experts to classify gender, ethnic origin, and pose of human faces. RBF/DT architecture is used to identify the gender, ethnic origin and pose of a human faces, further it is analyzed by using SVM classifier. The feasibility of this approach is demonstrated using FERET database and attained 96% accuracy. FERET is known as the most widely used dataset for evaluating gender recognition methods, and for age estimation FG-NET and MORPH [14] has been widely used. Hence, to reduce computation time a separate process for extraction and identification is required. Moreover, the performance of age estimation system in different situation separated into three different cases, which is usually measured by the Mean Absolute Error (MAE) [15], defined as the average of the absolute errors between ages and the ground truth ages.

A very simple process with low computational time was proposed by Juan bekios et al. [16]. The proposed process was a reassessment of linear discriminant technique for gender recognition. In selecting linear set of features to achieved maximum accuracy on a single database experiment we employs the use of linear classification technique and boosting algorithm. Tan levels and races [17], implemented a method called adaptive skin classification method to discriminate skin and non-skin pixels and to have great variability in terms of lighting conditions.

Human versus Machine performance has been proposed by Hu Han, Charles Otto, and Anil K. Jain [18][19]. They proposed a hierarchical approach for automatic age, gender and race estimation and provided an analysis for how long aging influence, individual facial components. Juan Bekios-Calfa, Jose m. Buenaposa and Luis Baumela [20], studied the problem of gender recognition from a multi attribute perspective. Gender recognition under constrained conditions (e.g. the color FERET database) is a well-known problem for which statement of the art algorithms provide performances well above 90%. However, when these algorithms are tested under real life conditions, significant drop in performance can be seen. The existence of conditional dependencies among various attributes like; gender, age and pose facial attributes, proves improvements in the performance of gender classifier by exploiting these relations. They achieved an 80.53 % success rate for the real setting in GROUPS database using an appearance based multi attribute linear classifier.

The multiple regression normalization strategy of gender identification process is a result oriented approach to study subject age, gender and it is used to identify differences in special temporal gait features [21]. The different gender classification methods, databases, testing methods, parameters and demerits in each gender identification process are analyzed to develop a novel gender identification technique with more accuracy and efficiency [1].

Table 1. Review of Some Feature Extraction Methods [15]

Feature Extraction method	Summary
Principal Component Analysis	<p>PCA is mathematically defined as an orthogonal linear transformation that transforms the data to a new coordinate system such that the greatest variance by some projection of the data comes to lie on the first coordinate (called the first principal component), the second greatest variance on the second coordinate, and so on.</p> <p>For example, consider a data matrix, \mathbf{X}, with column-wise zero empirical mean (the sample mean of each column has been shifted to zero), where each of the n rows represents a different repetition of the experiment, and each of the p columns gives a particular kind of feature (say, the results from a particular sensor).</p>

Multi-Manifold Discriminant Analysis	In MMDA, the within-class graph and between-class graph are designed, respectively to characterize the within-class compactness and the between-class separability, and define the criterion function to calculate projection matrix, seeking for the discriminant matrix to simultaneously maximize the between-class scatter and minimize the within-class scatter. Thus, the within-class graph can represent the sub-manifold information, while between class graph can represent the multi manifold information
Local Binary Patterns	<p>In LBP, LBP feature vector is created in its simplest form by using following steps:</p> <ul style="list-style-type: none"> ▪ Examine window id divided into cells (e.g. 20X20 pixels for each cell.) ▪ Comparison for each pixel in a cell to each its 8 neighbors (i.e. on its right top, left-top, right-bottom, left-middle and etc.), along a circle in clockwise or counter clockwise direction. ▪ A 8-digit binary number is generated (which is usually converted into decimal for convenience) by putting “0” where the center pixels value is greater than the neighbors value else put “1”. ▪ Now, histogram is computed over the cell, of the frequency of each number occurring. This histogram can be seen as a 256-dimensional feature vector. ▪ Normalization of the histogram, which is the optional step. ▪ Concatenation of histograms (normalized) of all cell, gives a feature vector for the entire window. ▪ The feature vector can now be processed using any classifier.
Gabor	<p>In the fields of computer vision, pattern recognition and image processing, gabor filter has large number of applications [22]. 2D Gabor filter is a selective filter in terms of frequency and orientation. Gabor filter response hasn't been disturbed by noise and distortion exists at different locations due to accuracy in time-frequency localization. Hence, performance of gabor filter is upto mark for noisy images [23]. As modulated by Gaussian envelop [57], for particular frequency and orientation, gabor filter is being considered as a sinusoidal plane.</p> $h(x, y) = s(x, y) \times g(x, y)$ <p>Where, $s(x, y)$ is a sinusoidal plane of particular frequency and orientation; and $g(x, y)$ is a 2D Gaussian function known as envelop.</p>
Discrete Cosine Transform	A DCT expresses a finite sequence of data points in terms of a cosine functions oscillating at different frequencies, while small high-frequency components can be discarded. The DCT is a Linear invertible function or equivalently an invertible $N \times N$ square matrix. There are several variants of the DCT with slightly modified definitions. The N real numbers x_0, \dots, x_{N-1} are transformed into the N real numbers X_0, \dots, X_{N-1} .
Scale invariant feature transform	SIFT extracts feature descriptors from various key points in an image. The key points are detected from the scale-space extrema, which typically correspond to edges, corners and other informative structural changes in the image. The descriptors are formed by the orientation histograms of gradient directions over local regions around the key point. SIFT features are invariant to image scaling and rotation, and partially invariant to illumination changes and affine distortions. Using these descriptors, objects can be reliably recognized even from different views or

Age Estimation Outline

There were several age estimation algorithms published in the last decade, these algorithms can be separated into two categories [24]: First is to estimate the actual age (for e.g. 20-year old); and the second is to classify a person image into an age range, like a baby, teenage, middle-age or a senior person. An age estimation system can be simply divided into three steps: image input, feature extraction and age estimation or age determination. The typical age estimation system diagram is shown in figure 3.

For facial feature related to human ages or facial appearance, change are extracted from human faces for compact representation; subsequently an age estimation function can be built to estimate the age based on the extracted features.

If considered an age estimation as a conventional classification problem [27], then the simplest way is to model face images at each age. Researchers found out that; ‘Age’ is a comparative concept specified to each person; every person age is different in a different ways [25] [26] [27]. A face at particular age is more related to the same persons face at different age rather than to other persons face at different age. Therefore, they prepared an aging pattern, the concept of aging pattern can be described as an aging pattern is a sequence of personal face images sorted in time order. Figure 4 shows some typical examples of the “full-filled” aging patterns when AGES (Aging pattern Subspace, an algorithm for automatic age estimation) [28] is applied over FG-NET Aging database.

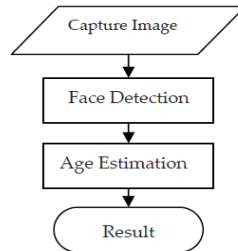


Figure 3. Age estimation system

Table 2. Different database available for gender classification with various poses, feature and total number of images in each database [1]

Database	Expansion	Total no of images in the database	Type of images
FERET	Face recognition technology	2413	Facial
IRIP	The laboratory of intelligent recognition and image processing	1089	Facial, Gait
LFW	Labeled faces in the wild	13,000	Facial
CASIA (dataset B)	Chinese academy of sciences	19,139	Gait
FRGC	Face recognition grand challenge	33,287	Facial
JAFFE	Japanese female facial expression	213	7 different emotional facial expressions
IMM	Informatics and mathematical modeling	240	Facial (still)
Purdue U	Purdue U database	3203	Facial
UND Biometrics	UND	33,287	Facial

Comparative Analysis of Different Gender Classification Methods

In Figure 1 below, different types of gender classification techniques have been described. Database available for human identification system and the methods used to extract features are shown for clear understanding.

According to the review of the previous investigation on the aforementioned gender classification methods, each has distinct advantages and disadvantages depending upon the requirements of the application. The review lists some of the major gender classification algorithms, database, methods used for feature extraction and classification. Some of the most commonly used parameters that help in gender identification process are, shape, texture, gender, ethnic origin, pose, gait shape, etc. Few gender classification methods were mentioned in Table 2,-together with their merits and demerits in each process. Moreover, the correct recognition result of five different gender classification methods with frontal face and gait from different database are examined and it is shown in Fig. 2. It is obvious that FERET database (frontal face) with mutual information has attained maximum accuracy of 99% accuracy. Next, the static and dynamic lip movement using DCT feature extraction process have attained 100 percentage accuracy. Finally, other feature extraction process with different parameters (frontal face and gait) has produce 96% of accuracy.

Analysis of five different gender identification methods with frontal face feature was done using different parameters such as, static dynamic lip movement, gender, ethnic, origin, pose, intensity, shape and various pose angle of human parts and it is shown in Fig. 2. Moreover, the database and accuracy of each classification process helps in understanding more about each gender identification algorithms. The advantages and disadvantages of different human identification process inspire us to develop a novel gender classification method with minimum computation time and maximum accuracy.

Discoveries from the Different Classification Methods for Gender Identifications

Several challenges have been faced by the existing classification methods in both the areas of application of 2D and 3D gender classification environment. For clear understanding of this process, result from the various gender classification methods for gender identification process are itemized. Resizing of image before and after feature extraction, computational time, pose variation, size, the classification using single database system, ethnicity, age and shape contribute to the most common parameters that are required to be analyzed for a good gender identification technique. High level of confidentiality on the datasets available for gender identification process to several hundreds of face images. Moreover, for different vector size feature selection process using mRMR, NMIFS, CMIFS and CMIM has minimum computation time. Though, research has shown that most common face identification system requires frontal pose of a subject.

From the literature, it was established that the proposed gender identification system fails for a person with different image positioning. Therefore, it is important to differentiate likely pose and to estimate original pose of an individual by using different process such as, normalization and detection of correct positioning. Getting a clear image quality when capturing frontal face of an individual, either the subject matter or the system must interact with each other. Then, there is also need for an unaligned facial image to be tested with several noises attacks in order to reduce the computational time in a large database and also to get maximum accuracy. Frontal face image normally requires specific region of interest to examine feature extraction process. The gender classification method with specific region of operation has produced poor results. Therefore, it is important to propose a gender classification method in a real time environment with less computation cost and to produce maximum accuracy for a system with autonomous size of the input images.

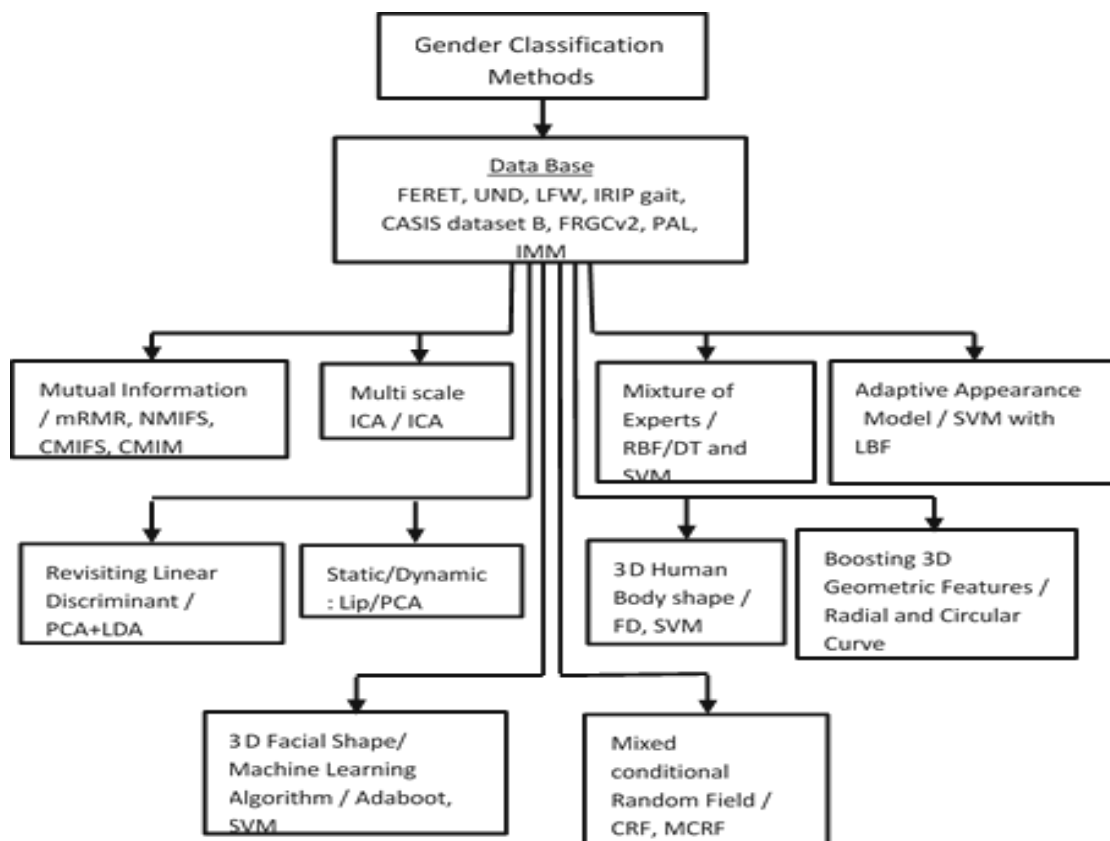


Figure 1. Various gender classification methods [1]. source: <https://www.researchgate.net/publication/321637452>

Database

1. FERET- Face Recognition Technology.
2. PAL- Programmatic Agreements Library.
3. LFW - Labeled Faces in the Wild
4. CASIA (dataset B) - Chinese Academy of Sciences
5. FRGC - Face Recognition Grand challenge.
6. IMM - Informatics and Mathematical Modeling.
7. IRIP - The laboratory of intelligent recognition and image processing

Techniques

1. SVM- Support Vector Machine.
2. MCRF- Mixed conditional Random Field
3. PCA - Principal Component Analysis
4. LDA- Linear Discriminate analysis
5. ICA- Independent Component Analysis.
6. RBF/DT- Radial Basis Function / Decision Tree.
7. FD – Fourier Descriptor.
8. mRMR – minimum Redundancy and Maximal Relevance.
9. NMIFS – Normalized Mutual Information Feature Selection.
10. CMIFS- Conditional Mutual Information Feature Selection.
11. CMIM - Conditional Mutual Information Maximization.

Table 2. Shortcomings in different gender classification methods

Techniques	Database	Method	Testing Result	Parameters	Demerits
Mixture of experts	FERET	RBF/DT, SVM	100%	Gender, Ethnic origin and pose	Single data base analysis and require more training for improved results Frontal face image
Mutual information	FERET,UND, LFW	mRMR, NMIFS, CMIFS, CMIM	90%	Intensity, shape and texture	Restricted database and size
Mixed Conditional random field	CASIS dataset B	CRF, MCRF	-	Gait shape	Appearance based feature extraction and computation cost
Multi scale ICA	PAL	ICA	-	Size and coefficient of mask	Computation cost, restricted database and Size
Static/dynamic: lip	FERET and FRGCv2	PCA	100%	Lip Movement	Condition and change in speaker pose
Revisiting linear Discriminant	FERET and UCN	PCA + LDA	80%	Linear feature selection (pixel within the sample)	Limited data and computation resources

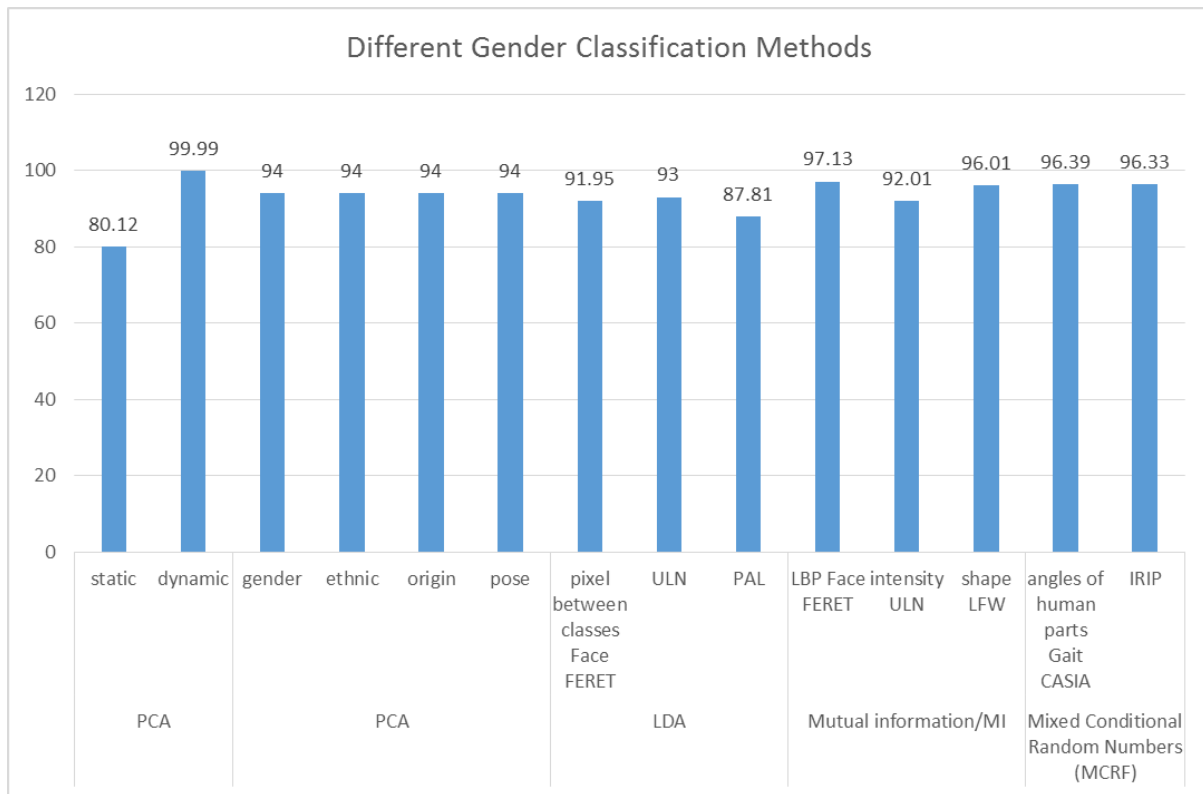


Figure 2. Accuracy of different gender classification methods
Source: <https://www.researchgate.net/publication/321637452>

Database

1. FERET- Face recognition technology.
2. PAL- Programmatic agreements library.
3. LFW - Labeled faces in the wild.
4. CASIA (dataset B) - Chinese academy of sciences
5. FRGC - Face recognition grand challenge
6. IRIP- The laboratory of intelligent recognition and image processing.

Technique

1. MCRF- Mixed conditional random field.
2. LDA- Linear discriminate analysis
3. RBF/DT- Radial basis function / decision tree

Conclusion

In this paper different gender classification algorithms and the various parameters used for gender identification methods were study. These parameters used to identify the Gender of a person are; Gender, pose, ethnic origin, shape, intensity, face, fingerprint, texture, gait shape, iris, lip movement and 3D face from laser scanning. Analysis on the experimental results of the existing processes was done to improve the performance of gender classification/identification methods. From the study, it was concluded that the applicability of a particular gender classification technique depends on the environmental requirements. Thus a single approach cannot satisfy all the gender classification requirements in various conditions, and each gender classification approach is suitable in a particular field according to the characteristic of performance. The Mutual information (MI) obtained using histogram of LBF, intensity and shape has produced 90% accuracy, which is found to be an improved result than the other existing algorithm. Subsequently, the computation time of gender classification method is reduced in advantage of gait and Mixed Conditional Random Field (MCRF), and it has attained 100% accuracy. An improved result was also achieved by the geometric based 3D gender classification method in terms of accuracy. Previous researchers have usually attempted to select only the features they require, rather than using all the features by exchanging efficiency for accuracy of classification. Therefore, data reduction methods are more convenient for selecting the target features. It is concluded that the gender classification accuracy changes with biometric authentication environment with different face orientation. The current gender

identification methods have not focus more on different face orientation, which is very much essential for a gender classification technique to meet high amount of accuracy and efficiency in different environment. Additionally, a new multi feature SVM using face pyramid has achieved good results in gender recognition, age identification and name identification of an individual. The multiple regression normalization is considered to be more suitable for identifying spatial temporal gait features. Thus, the study reveals that the existing approaches also have some limitations such as low accuracy, low efficiency, and restricted application domain in various gender identification algorithms that helps in developing a new gender identification method with high accuracy, low computational cost and high efficiency in future.

Recommendations

Future research effortd should focus on the enhancement of the accuracy and realiability of the new system that will improve the performance of gender and age classification system.

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An Investigation of the Effects of Teachers' Classroom Questioning Techniques on the Performance of Senior Secondary School Students in Mathematics, Zamfara State, Nigeria

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Abstract: Majority of the research finding shows that questioning techniques is one the major factors affecting the teaching and learning mathematics in our schools. This study is designed to seek views of the Students on the effects of teachers' classroom questioning techniques on their performance in mathematics. The opinion of 1000 Senior Secondary Schools Students level from same selected schools in Bungudu Local Government of Zamfara state was sought on a four Likert scale questionnaire. The instrument consisting of forty statement on how they perceived the effects of the teacher's classroom questioning techniques in mathematics. The results showed that the respondents agreed that their teachers' classroom questioning techniques were having a positive impact in their learning outcome performance in mathematics. The t-test results showed that there was gender significant difference on the effects of the teacher's questioning techniques in relation to mathematics performance. The result also revealed that there was significant difference existed between the choice of subject and students learning experiences. However, based on the findings of the study, the researchers recommended that workshops, seminars, conferences and in-service training be organize for the mathematics teachers on how to use effective classroom questioning techniques in the teaching and learning mathematics senior secondary school level. It was also recommended that the classroom questioning techniques be included in the mathematics curriculum for teacher's education programmes.

Keywords: Investigation, Effects, Teacher questioning techniques, Performance

Introduction

The pursuit for general development along with scientific, technological growth and self -reliance are harmonized with corresponding advanced in mathematics. However, any laudable achievement in technological development will be hindered if the potential scientists, engineers and technologist are not equipped with sound knowledge of mathematics. Therefore, it can be concluded that no other subject has greater application than mathematics. It is the prime instrument for understanding and for exploring scientific, economic and social world. Agwagah(2013) affirms that mathematic is an indispensable tool in virtually all human endeavours of life as there is hardly any field where mathematics is not useful. That is why mathematics is offered as a compulsory subject both at the primary and secondary school levels in Nigeria.

In spite of the importance attached to mathematics both as an academic discipline and the body of knowledge that everybody needs in society coupled with the effort of the government in making mathematics a compulsory subject at the primary and secondary schools, the performance of students in mathematics at secondary school level in Nigeria is discouraging. The teaching of mathematics has been observed to be confronted with many problems such as teacher's approaches of teaching, students' attitude and unavailability of learning materials among others; thus, making it matter of concern to parents, researchers and educators.

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

Findings from recent studies (Adebola and Ajilogba, 2012), have revealed that students mass failure in mathematics in internal and external examinations are real and the trends project a danger for the nation's quest for scientific advancement. The researchers note that the deplorable state of performance in mathematics is attributed to a number of variables, such as classroom teachers' non-utilization of appropriate questioning techniques. One of the major responsibilities of a mathematics teacher is to advance thought and inspire inquiry in students, and one effective way of doing this, is through proper questioning techniques in the classroom (Omobola, 2010). Teachers' classroom techniques influence student's motivation, effect learning styles and perfection of self-efficacy as well as teaching practice and teacher-students relationship. This was supported by Croom and Strair (2005) when teachers questioning techniques are used appropriately, it can enhance students the teaching and learning by developing critical thinking skills. It can also reinforce students understanding, correct students misunderstanding, provide feedback for students and stimulate classroom discussion. Also, MCHill and Dunkin (2002) discovered that a good question is a powerful teaching tool and a good teacher should know how to use questions for maximum impact because it is important to use classroom question well in order to teach effectively (Omolola, 2010). Fawowe (2013) indicated that, learning of mathematics improves when teachers allow their students to ask question/participate actively in the activities of the lesson than allow them to engage solemnly in a passive intake of information. It is worthwhile to look at researches conducted on some specific aspects of classroom questioning on techniques.

Ghandoura (2002) studied the effect of teachers written comments on the students' homework papers in geometry among fourth, sixths and ninths grade mathematics classes in Mecca, Saudi Arabia. Two classes for each teacher were randomly assigned, one as the control group (no comment) and the other class as the experiment group (comment). For ten weeks, the teacher collected homework papers three times a week. The homework papers in the control group were graded by marking problems right or wrong. Homework papers in the experimental group were graded the same way and had teachers comment such as, very good, well done, good, fair, poor etc. The result revealed a significant difference between effectiveness of teachers' comment and student's achievement.

Howkins (2009) investigated the effect on feedback on geometrical lesson of seventh and eighth grades according to sex, grade level and test scores. Mathematics Diagnostic Test was administered to diagnose students' abilities in geometry. Pre-assessment were conducted by the classroom teachers and mathematics diagnostic test were administered. Groups were randomly assigned to one of the three feedback treatment or the denied treatment groups as follows:

- F1 return pre-mathematics test papers with corrected incorrect answer.
- F2 return pre-mathematics test papers without corrected incorrect answers.

Purpose of Study

This study is designed to:

- a. Seek the opinion of the senior secondary school students on their teacher's classroom questioning techniques as having in their learning experience?
- b. Also determine the gender differences regarding the perceptions of students on the effects of teachers' classroom questioning techniques on their achievement.

Research Questions

The following research questions were used to guide the study:

- 1. Did students perceived their teacher classroom questioning techniques as having effect in their learning experiences?
- 2. Is there any difference between male and female students' perception on their teacher classroom questioning techniques as having effect in their learning experiences?
- 3. Will there be any difference between the science and arts student's perception on effect of teachers' questioning techniques in their learning maths?

Research Hypothesis

- 1. There is no significant significant difference between male and female students' perception on their teacher classroom questioning techniques as having effect in their learning experiences

2. There is no significant significant difference between Science and Arts students' perception on their teacher classroom questioning techniques as having effect in their learning experiences

Method

The data was generated through a questionnaire which was adapted based on a literature on the important and effectiveness of teachers' classroom questions developed and validated by Adedoyin (2010). The questionnaire consisted of two sections A and B. in section A students were asked about their background information. While section B consisted of forty (40) closed ended question statements form on the effectiveness of teachers' classroom questions on the performance or learning outcome in mathematics. The instrument is four point-likert rating includes strongly Agree (SA), Agree (A), Disagree (D) and strongly Disagree (SD). A total 1000 students were randomly selected for the study. The mean response was used to analyse the data generated from the questionnaire. In other to determine degree of agreement/disagreement in each of the scaling statements in the questionnaire, nominal values of 4 to 1 were assigned to the different scaling statement where 4 was for strongly agree, 3 for agree, 2 for disagree and 1 for strongly disagree. The teachers' classroom questioning techniques was designed to seek the opinion of students on the effect of their mathematics teacher's classroom questions on their performance. The mean response was used to analyse the data generated from the questionnaire. Consequently, any response with a mean of 2.5 or more was regarded as agree and any response that was below 2.5 was regarded as disagreed.

Research question I:

Table 1. Mean and standard deviation on student's perception on Teachers Questioning Techniques

Statement	N	Mean	Std. Deviation	Remark
1. My teacher's classroom questions raises pupils attention and participation in the mathematics lesson.	1000	3.2940	.79511	Agreed
2. My teacher's classroom Questions reinforce pupil's mathematics learning.	1000	3.2860	.73263	Agreed
3. My teacher's classroom questions make the teaching of mathematics interesting.	1000	3.2000	.78525	Agreed
4. My teacher's classroom questions motivate pupils to learn mathematics.	1000	3.2640	.73949	Agreed
5. My teacher' classroom Questions improve pupil's high level thinking skills in mathematics.	1000	3.0840	.67037	Agreed
6. My teacher's classroom questions are used to identify student's existing knowledge in mathematics.	1000	3.1200	.66486	Agreed
7. My teacher's classroom questions help pupils to participate in mathematics classes.	1000	3.0540	.77180	Agreed
8. My teacher's questioning techniques is an effective measure to manage and control classroom for effective learning mathematics.	1000	3.3000	.60528	Agreed
9. My teacher's classroom questions can be an effective way to find out what pupils have mastered after the teaching process.	1000	3.1920	.66902	Agreed

10. My teacher's classroom questions in mathematics classroom are very useful for feedback purposes.	1000	3.1700	.63364	Agreed
11. My teacher's classroom questions are always based on students needs.	1000	2.2260	.73448	Disagreed
12. My teacher's classroom questions can be used as a follow up to help learning mathematics.	1000	2.9980	.66516	Agreed
13. My teacher's classroom questions are very useful to probe students understanding.	1000	3.3300	.71387	Agreed
14. My teacher's classroom questions are very useful for prompting student's thinking skills in mathematics.	1000	3.3960	.65697	Agreed
15. My teacher's classroom questions are used to diagnose students learning problems in mathematics.	1000	3.2900	.74192	Agreed
16. My teacher's classroom questions develop deep cognitive critical thinking for mathematics learning.	1000	3.3220	2.02939	Agreed
17. My teacher's classroom questions are use as positive reinforcement for student learning.	1000	3.1440	.59297	Agreed
18. Teacher's classroom questions are always geared students towards positive learning outcomes.	1000	2.9740	.78098	Agreed
19. My teacher's classroom questions are used to gain further insight of student's mathematical ideas.	1000	3.0820	.66912	Agreed
20. My teacher's classroom questions always have an impact on students' mathematical understanding.	1000	3.0820	.75089	Agreed
21. My teacher's classroom questions lead to discussions and communication of mathematical ideas.	1000	3.3180	.69955	Agreed
22. My teacher's classroom questions prompt students to express themselves freely.	1000	3.1240	.68782	Agreed
23. My teacher's classroom questions stimulate students to pursue maths knowledge on their own.	1000	3.1080	.76480	Agreed
24. My teacher's classroom questions can be used to evaluate students' readiness to learn mathematics.	1000	3.1900	.61178	Agreed
25. My teacher's classroom				

questions help to identify students retention in mathematics knowledge.	1000	3.2740	.68658	Agreed
26. My teacher's classroom questions help to stimulate students' thinking abilities in solving mathematics problems.	1000	3.0540	.72084	Agreed
27. My teacher's classroom questions develop students inquiring attitudes in mathematics.	1000	3.2080	.70798	Agreed
28. My teacher's classroom questions help in assessing achievements of instructional goals and objectives during mathematics lessons.	1000	3.0100	.80905	Agreed
29. My teacher's classroom questions always make students active in mathematics lesson.	1000	3.0340	.71928	Agreed
30. My teacher's classroom questions help in reviewing and summarising of previous lessons.	1000	2.9820	.74983	Agreed
31. My teacher's classroom questions encourage students to pay attention in mathematics lessons.	1000	2.3860	1.00738	Disagreed
32. My teacher's classroom questions encourage students to think during mathematics lessons.	1000	3.8180	4.14464	Agreed
33. My teacher's classroom questions empower students to do well in mathematics.	1000	3.1600	.75827	Agreed
34. My mathematics teacher asks a lot of questions during lessons.	1000	3.1940	.71054	Agreed
35. Teacher's classroom questions always have an impact on students understanding of mathematical concepts.	1000	3.0680	.73206	Agreed
36. My teachers' classroom questions have an impact on student's performance in mathematics.	1000	3.9080	5.47773	Agreed
37. My teacher's classroom questions do help students to pass mathematics examination/test.	1000	3.0520	.71681	Agreed
38. Students do not need teachers' classroom questions to be able to do well in mathematics.	1000	2.2540	1.08197	Disagreed
39. My teacher's classroom questions make me to learn mathematics better.	1000	3.3980	.62609	Agreed
40. A lot of time is wasted in learning mathematics, when the teacher asks questions.	1000	3.2340	.70693	Agreed

Research Question 2:

Is there any difference between male and female students' perception their teacher classroom questioning techniques as having effect in their learning experiences?

To find it there were significance differences between the male and female in the perception of the students on the effect of the students' classroom questioning techniques in the performance in mathematics, the responses of the students to the questionnaire were analyse using t-test. Out of the forty items on the questionnaire seven items exhibited gender significant differences at 0.05 alpha levels. The results of the independent t-test, which showed that there were gender significant differences at 0.05 alpha level in the perceptions of students on the effects of teachers' classroom questioning techniques in mathematics lesson in the following areas:

- (Item 2) My teacher's classroom questions reinforce pupil's mathematics learning (mean for male students is 3.24 and the mean for female is 3.36, significant at 0.01)
- (Item 4) My teacher's classroom questions motivate pupils to learn mathematics. (mean for male students is 3.22 and the mean for female is 3.34, significant at 0.01)
- (Item 17) My teacher's classroom questions are used as positive reinforcement for student learning (mean for male is 3.19 and the mean for female is 3.52, significant at 0.03)
- (Item 24) My teacher's classroom questions can be used to evaluate students' readiness to learn mathematics (mean for male is 3.01 and mean for female is 3.13, significant at 0.04)
- (Item 34) my mathematics teacher asks a lot of questions during lessons (mean for male is 3.59 and mean for female is 4.15, significant at 0.03)
- (Item 36) My teacher's classroom questions have an impact on students' performance in mathematics (mean for male is 3.51 and mean for female is 4.40, significant at 0.04)
- (Item 40) A lot of time is wasted in learning mathematics, when the teacher asks questions (mean for male is 3.19 and mean for female is 3.31, significant at 0.01)

Research Hypothesis 1

There is no significant significant difference between male and female students' perception on their teacher classroom questioning techniques as having effect in their learning experiences

Table 2: T-test of male and female students on their perception on the questioning techniques.

Gender	N	Mean	SD	Df	T.cal	T-tab	Decision
Male	600	3.27	0.34	998	-0.4	0.95	NS
Female	400	3.28	0.20				

From Table 2, t-calculated of -0.4 is less than table value of 0.95, which indicates that the difference in the mean is insignificant. Therefore, the hypothesis is accepted. This show that male and female students perception on their teachers questioning techniques are the same.

Research Question 3

Will there be any difference between the science and arts student's perception on effect of teachers' questioning techniques in their maths learning?

- To find it there were significance differences between the Science and Arts in the perception of the students on the effect of the students' classroom questioning techniques in the performance in mathematics, the responses of the students to the questionnaire were analyse using t-test. Out of the forty items on the questionnaire seven items exhibited significant differences at 0.05 alpha levels. The results of the independent t-test, which showed that there were significant differences between science and arts students at 0.05 alpha level in the perceptions of students on the effects of teachers' classroom questioning techniques in mathematics lesson in the following areas:
 - (Item 2) My teacher's classroom questions reinforce pupil's mathematics learning (mean for science students is 3.12 and mean for arts is 3.38, significant at 0.01)
 - (Item 4) My teacher's classroom questions motivate pupils to learn mathematics (mean for science students is 3.19 and mean for arts is 3.38, significant at 0.01)
 - (Item 21) My teacher's classroom questions lead to discussions and communication of mathematical ideas (mean for science students is 0.62 and mean for arts is 3.09, significant at 0.01)

- (Item 30) My teacher's classroom questions help in reviewing and summarizing of previous lessons (mean for science students is 3.15 and mean for arts is 5.25, significant at 0.02)
- (Item 35) Teacher's classroom questions always have an impact on students understanding of mathematical concepts (mean for science students is 4.15 and mean for arts is 6.95, significant at 0.04)

Research Hypothesis 2

There is no significant significant difference between Science and Arts students' perception on their teacher classroom questioning techniques as having effect in their learning experiences

Table 3. T-test of Science and Arts students on perception of Teachers' Questioning Techniques

Subjects	N	Mean	SD	Df	T.cal	T-tab	Decision
Science	500	4.38	1.42	998	0.62	0.95	NS
Arts	500	3.03	1.03				

From table 111, calculated t-value of 0.62 is less than table value of 0.95 and this shows that there is no significant difference in the Science and Arts students opinion on their teachers questioning techniques. For this the hypothesis is accepted.

Findings

The study sought to seek the opinion of SSII students at the Bungudu Local Government Area of Zamfara State on the effects of teachers questioning techniques with regards to their performance in mathematics. The research of mathematics teacher's classroom questioning techniques is very important not only for facilitating students' teaching and learning but also improving teacher proficiency in the classroom at secondary schools. The result showed that significant difference existed between genders in learning maths. The finding is consistent with the available literature by Omobola (2010) and Adebola & Ajibogba (2012) that stated the role of teachers' classroom questioning techniques as an important teacher-quality which influences students' academic performance. In a similar finding, Croom and Stair (2005) established that teachers' classroom questioning techniques enhances students teaching and learning by developing critical thinking skills. The result also revealed that significant difference exists between the science and art students on their perception on effect of teachers' questioning techniques.

Conclusion

From the results it can be recommended that in-service workshops should be provided for mathematics teachers on how to use effective classroom questioning techniques to improve learning experiences of students. Also teachers should be exposed to various questioning techniques and it is important at the Colleges of Educations, Faculty of Education and other Teacher Education Institutions. The issue of good use of teachers' classroom questioning for effective learning outcome should be incorporated in the various teacher training colleges in Nigeria.

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