World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Effect of experiential instructional approach on senior secondary school students' achievements in Algebra in Ebonyi State

Anugwo Margaret Ndidiamaka, Enyi Paul Onyebuchi, Ugama Julius Ongele, Egbe Irene Ogochukwu, Okpube Michael Nnaemeka, Ngwu Uchenna Nwigwe, and Ikporo Festus Boss

Department of Science Education, Ebonyi State University, Abakaliki, Nigeria.

World Journal of Advanced Research and Reviews, 2024, 23(02), 1170–1178

Publication history: Received on 05 July 2024; revised on 12 August 2024; accepted on 14 August 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.23.2.2467

Abstract

Mathematics is generally considered a fundamental base for preparation to life and for functionality of every citizen of any nation in any career. Therefore, this study investigated the effect of experiential instructional approach on senior secondary school (SSS) II students' achievements in Algebra in Abakaliki education zone of Ebonyi State. Specifically, the study determined effect of experiential instructional approach on SSS II students' mean achievement scores in Algebra, effect of experiential instructional approach on male and female SSII students' mean achievement scores in Algebra and the interaction effect of gender and methods on the SSS II students' mean achievement scores in Algebra. Three research questions and three hypotheses guided the study. The study employed a non-equivalent control group quasi-experiential design. A sample of 210 SSS II students from 4 coeducational SSS was used with their intact classes. Out of the four schools, two schools were simple randomly assigned to treatment group while the remaining two schools to the control group. Algebra achievement test (AAT) with reliability coefficient of 0.85 was the instrument for data collection. The data was analyzed using mean, standard deviation and analysis of co-variance (ANCOVA). The result revealed that students taught with experiential instructional approach achieved better than the students taught with the conventional approach with a mean of 29.89 and 24.52 respectively. The study also revealed that males taught with experiential approach showed higher achievement with a mean of 31.08 than the females with a mean of 28.34, but the difference in the mean achievement of males and females taught using the method was not statistically significant. There was no significant interaction effect between gender and instructional methods on the students' achievement in Algebra. The study, therefore recommended that experiential instructional approach be adopted in our school system and that there is need for an urgent curriculum review to include experiential approach as a teaching method for mathematics.

Keywords: Experiential; Instructional Approach; Achievement; Algebra; Conventional Method

1. Introduction

Mathematics has been generally considered as a fundamental base for preparation to life and functionality of every citizen of any nation in any career. The importance of Mathematics to the modern culture of science and technology has been well recognized and accepted globally [1]. Mathematics is not just an important subject but essential for many of our daily tasks, thus, it provides man with numerous skills and knowledge to control the forces of nature around him [2]. (Crow In another study Mathematics is designed to specifically help man to number, count, compute, weigh, measure, do business, and carry out a lot of activities [3]. The study further described Mathematics as a subject, discipline and body of knowledge that is quite indispensable to man. Its importance to man necessitated its inclusion in the school curriculum as an important and a compulsory subject for all school children so as to obtain the requisite skills

* Corresponding author: Anugwo Margaret Ndidiamaka

Copyright © 2024 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution Liscense 4.0.

that will make them live and contribute to the society. The immense role of Mathematics to human life has generated a lot of attention among scholars and researchers. The branches of Mathematics include; Algebra, Calculus, Trigonometry, Statistics, Analysis and Geometry.

Algebra is derived from the word *M-Jabril-Muqubulah*; where 'M' means 'the', '*Jabr*' is the operation of changing a quantity from one side of an equation to the other side, while *Muqubulah* is the subtraction of similar variables from both sides of an equation [3]. Introduction of Algebra made the students to learn the extent the number system of arithmetic could be performed in all cases (multiplication, addition, subtraction and division) [4]. Kulbi affirmed that it is one of the most difficult and abstract branches of Mathematics. The study of Algebra is useful in other branches of Mathematics as it provides the formulae to be used in all cases. It is applied in trades and industries.

Despite the usefulness and relevance of Mathematics to national development and man's daily activities, students still record poor achievement in Mathematics. The West African Examination Council (WAEC) Chief Examiners Report on SSS Mathematics Certificate results, shows that students over the years, have been recording poor achievement in Mathematics, especially in Algebra [5]. Their reports indicate that most students avoided Algebra questions while some attempted them haphazardly. Other studies also confirmed this poor achievement of students in Mathematics [6-9]. They noted that this situation coupled with poor formation of Algebra concepts among students and overall poor performance of post primary school students in general Mathematics could raise doubts on the effectiveness of existing instructional approaches for Mathematics instruction in secondary schools. In fact, the approach to Mathematics instruction in Nigeria has been criticized as hopeless and incapable of inculcating relevant Mathematical skills on the learners [7]. The conventional teaching approach has been accused of estrangement and weak in enhancing students' achievement in Mathematics and Algebra in particular [8]. Although efforts at improving Mathematics instruction have been made through improvisation and use of other instructional techniques, the status of Mathematics education in our secondary schools in terms of Mathematical concept development and achievement continues to dwindle [9]. Various reasons and factors were suggested that contributed to the poor achievement of students in Algebra. Most of the speculations point directly to instructional pedagogy. As such, an approach that will boost students' achievement in Algebra must be such that can engage students actively during the teaching-learning process. Although experiential teaching approach may be very efficacious in enhancing students' achievement in Mathematics and Algebra in particular, it has not been in use as an instructional approach in some schools as the researchers' literature review revealed.

Shafi stated that conventional method of teaching (talk and chalk lecture method) is still a common practice in Nigeria secondary schools and has continued to dominate the Mathematics classroom. He further noted that when this method (talk and chalk lecture method) is used during instructional delivery, students acquire Mathematical skills and concepts by imitating demonstration by the teacher and absorbing textbook communications [10]. This approach to learning is not only ineffective but seriously hinders students' interest and achievement in Mathematical reasoning and problem solving skills [11]. This is because the conventional method also referred to as teacher directed instruction, rote memorization, drill and verbal recitation and worksheet completion had failed to develop students' generic skills, interest and improved performance in Mathematics. Consequently, students struggle to understand Mathematics with many seeing it as an abstract concept. This method is seen to hinder students' achievements in Mathematics at both internal and external examinations [8,12]. Although teachers use this method to cover the content areas in their syllabuses at the expected time, yet, it follows that there is urgent need for Mathematics teachers to adopt innovative and practical oriented instructional method that is capable of stimulating students' interest and enhancing their achievement in Algebra. This study determined whether experiential teaching approach will serve the purpose.

Experiential instructional approach is teaching through first-hand experience. It is a teaching method that enables the students to be engaged in concrete activities which help them to understand the concepts by themselves with the guidance of the teacher. The students will be provided with the learning materials and are allowed to perform the operation with little guidance from the teacher. The method will allow them to make use of their initiative and experience in the learning environment. The students do hands-on activities. Kulbi conceptualized experiential teaching approach as learn-by-practicing approach. In Experiential instruction, students are given opportunity to learn and apply knowledge, skills in their immediate environment and relevant settings [13]. The experiential instructional approach makes learners to be active in the classroom, self-explorative; they gain insight into the situation, acquire problem solving skills and have self-understanding of the concepts. Diem noted that experiential instructional approach could help to build self-esteem in learners, makes the teaching-learning process more fun, stimulates students' interest and enhances achievement. He further noted that the approach could help develop the psychomotor domain ability of the learners because students learn by doing. The study looked at its effects on the achievement of students in Algebra [14].

Academic achievement has to do with what the students gained at the end of teaching and learning process. The effectiveness of an instruction will determine what the students will gain at the end of an instruction and how the students are affected gender wise. Gender differences on students' achievement in Mathematics have attracted the attention of a lot of researchers with mixed results [8,15]. Some researchers agreed that neither males nor females are superior in general Mathematics achievement [15-18]. This shows that males and females students have the same understanding of Mathematics and achieve equally if Mathematics concepts are meaningfully taught in schools. Others like (Kurumeh & Iji [19]; Shafi, [10] reported that males achieve better than females in some Mathematics concepts, while some scholars found out otherwise [9,20]. In view of these contradicting results, the researchers determined whether the use of experiential approach in teaching of Algebra could affect males and females achievement differently.

The argument of using experiential approach in the classroom instruction lacks empirical data and this calls for this research. The quest of this study therefore was to establish the efficacy of experiential teaching method on secondary school students' performance in Algebra.

1.1. Purpose of the Study

The purpose of the Study was to determine effect of experiential instructional approach on the mean achievement scores of SSII students in Algebra. Specifically, the study determined:

- effects of experiential instructional approach on mean achievement scores of SSII students in Algebra.
- effects of experiential instructional approach on mean achievement scores of male and female SS II students in Algebra.
- interaction effects of gender and methods on SSII students' mean achievement in Algebra.

1.2. Research Questions

The study was guided by the following research questions:

- What is the effect of experiential instructional approach on mean achievement scores of SSII students in Algebra?
- What is the effect of experiential instructional approach on mean achievement of male and female SSII students in Algebra?
- What is the interaction effect of gender and methods on mean achievement scores of students in Algebra?

1.3. Hypotheses

- Ho1: There was no significant difference between the mean achievement scores of SSII students that were taught Algebra using experiential instructional approach and those taught Algebra using the conventional approach.
- Ho2: There was no significant difference in the mean achievement scores of male and female SSII students taught algebra with the experiential instruction approach.
- Ho3: There was no significant interaction effect between teaching methods and gender on students' mean achievement scores in algebra.

2. Methodology

2.1. Design of the study

The study employed quasi-experimental research design. The study adopted the non-randomized control group pretest, post-test design. This design was adopted because there was no initial equivalence due to non-randomization of sample. Intact classes of SSII were used. The effect was cushioned by the use of Analysis of co-variance (ANCOVA).

2.2. Area of the study

Area of the study was Abakaliki Education zone of Ebonyi State, Nigeria. Abakaliki Educational zone comprised four Local Government Areas which include; Ebonyi LGA, Abakaliki, Izzi and Ohaukwu LGAs. The LGA has 66 public secondary schools which was used for the study.

2.3. Population for the study

The population of the study includes all SSII students in Abakaliki education zone, numbering 2,465 from all the 66 Senior Secondary Schools within the four Local Schools Government Areas that make up the Abakaliki Educational Zone. Source: Secondary Education Board (SEB), Abakaliki. The study would have used the SSIII students because they are the class that have covered the highest content areas in Secondary School Mathematics, but they were not used because they are in examination class. SSII are the next class, hence the choice of SSII students.

2.4. Sample of the study

The sample of the study was 210 SSII students drawn from the zone through simple random sampling, after stratification of the zone into four Local Government Area. One coeducational secondary school was simple randomly drawn from each LGA in the zone making it a total of 4 schools. Two of the schools were also simple randomly selected and tagged the treatment while the other 2 became the control group. Intact classes of these schools were used.

2.5. Instrument for data collection

The Instrument for data collection was the Algebra achievement test (AAT) developed by the study. It has 40 questions and 5 options lettered A-E. The instrument is made up of two parts, Part A and Part B. The Part A explored information on the respondents while Part B are Algebra questions derived from SSII scheme of work for the term namely simultaneous equation, simplification, change of subject formula and factorization. The test blue print was used to ensure content validation. It was also face validated by one expert in Measurement and Evaluation and 2 Mathematics specialists. The difficulty and discrimination indices were determined to ensure that the questions discriminate positively. A difficulty indices of 0.4 - 0.7 were used to select the good questions. Kuder Richardson 20 was used to determine the the coefficient of internal consistency of 0.85, used on the data collected from trial testing conducted among SSII students in Enugu State.

2.6. Method of data collection

The study made use of research assistants (Mathematics teachers in the sampled schools) and trained them on how to apply the teaching methods. So that every teacher does the same thing to create uniformity and avoid teacher variable. It ensured the same instructional situation in all the schools. Before the experiment, a pretest of the Algebra achievement test (AAT) was given to both the treatment and control groups. The pretest scores were recorded. The same topics were taught by the intact teachers for 6 weeks to both treatment and control groups. The treatment group was taught with experiential instructional approach and the control group taught with the conventional, chalk and talk lecture method. There was post tests administered to the 2 groups after the experiment. Post test was AAT reshuffled and color of the original paper changed to prevent students' recognition of the AAT. Schools sampled for the experimental and control groups were far apart to avoid subjects' interaction. There was a lesson plan (which directed the teacher on how to teach his / her lessons) developed for each group.

2.7. Data Analysis techniques

The research questions were analyzed using mean and standard deviation. The hypotheses were tested at 0.05 level of significance using the analysis of covariance (ANCOVA) to cushion the effect of non-randomization. The paper was marked over 40 and pass mark was 25.

3. Results of the Study

Table 1 Mean achievement and Standard Deviation scores on the effect of experiential instructional approach on SSII students in Algebra**.**

Group.	Mean.	Std	Dev. N
Treatment.	29.89	5.28	. 104
Control.	24.52.	5.42.	.106

N = Number of Sample. Std Dev. = Standard Deviation

Table 1shows that the mean achievement scores of SSII students taught Algebra with experiential instructional approach was 29.89 with a standard deviation of 5.28. While those taught with the conventional teaching method had a mean achievement score of 24.52 with a standard deviation of 5.42. The paper was marked over 40 and pass mark is

25. The students in the experimental group passed and did better than those in the control group. The variability of scores is small, showing that the scores are close to the mean.

3.1. Research Question 2

To answer this question, the mean achievement scores of male and female students taught Algebra using experiential instructional approach is presented in Table 2 below.

Table 2 Mean achievement scores and standard deviation of male and female students taught Algebra using the experiential teaching approach

Group	Mean	S.D
Male	31.08	4.52
Female	28.34	5.75

Table 2 shows that the mean achievement scores of male students taught Algebra with experiential instructional approach was 31.08 with a standard deviation of 4.52 while their female counterpart taught Algebra with Experiential Approach had a mean achievement score of 28.34 with a standard deviation of 5.75. Both gender passed the test, though the males did better than the females. The variability for both groups is low

3.2. Research Question 3

Interaction effect of gender and methods on the mean achievement scores of SSII Students' in Algebra.

Table 3 Interaction effect of methods and gender on students' mean performance in algebra

Method	Gender	
	Male	Female
Experiential Approach	31.62	30.55
Conventional Method	29.25	27.42

Table 3 shows that experiential instructional approach brought about higher students' achievement scores with a mean of 31.62 for males. Experiential Approach also favored the females with a mean of 30.55. Females taught with conventional Approach also did well with a mean 29.25 and 27.42 for the males and females respectively. This implies that there is no interaction effect between methods and gender on students' achievement in Algebra.

3.3. $H0_1$: and $H0_3$

These two hypotheses were tested using analysis of co-variance.

Table 4 Analysis of co-variance of students' overall Algebra achievement scores by teaching method and gender

Source of variation	Sum of Squares	DF	Mean Square	Fcal.	F.prob
Covariates	25.496	1	25.496	.967	.327
PRETEST	25.496	1	25.496	.967	.327
Main Effects	441.784	2	220.892	8.378	.000
Method	10.291	1	10.291	.390	.533
Gender	432.609	1	432.609	0.408	2.04
2-Way interactions	83.153	1	83.153	3.154	.018
Method Gender	83.153	1	83.153	3.154	.077

Explained	550.433	4	137.608	5.219	.001
Residual	5404.848	205	26.365		

For hypotheses 1, analysis of co-variance of the students overall achievement scores presented in table 4 shows that the alpha value of 0.05 is greater than the critical F-prob of 0.00. The null hypotheses which stated that there is no significant difference in the mean performance score of students taught algebra using experiential teaching approach and those taught using the conventional method was rejected. The significant difference observed between the mean achievement scores of the treatment and the control group was statistically significant in favour of the experiential group.

For hypotheses 3, the results presented in table 4 shows that the observed difference in the two-is greater than the F.prob. of 0.018. it was therefore concluded that there was no significant interaction between method and gender on students' achievement in algebra.

- **$H0_2$:** This hypothesis was tested using analysis of co-variance for overall achievement score by experiential teaching method by gender. The summary is as shown in table 5.

Table 5 Analysis of co-variance for overall performance for experiential teaching method by gender

Source of variation	Sum of Squares	DF	Mean Square	Fcal.	F.prob
Covariates	25.496	1	25.496	.967	.327
PRETEST	25.496	1	25.496	.967	.327
Main Effects	441.784	2	220.892	8.378	.000
Method	10.291	1	10.291	.390	.533
Gender	432.609	1	432.609	0.408	2.04
2-Way interactions	83.153	1	83.153	3.154	.018
Method Gender	83.153	1	83.153	3.154	.077
Explained	550.433	4	137.608	5.219	.001
Residual	5404.848	205	26.365		

In table 5. The difference observed in the overall achievement of both gender is not significant. This is as a result of the fact that the calculated value of F-cal 0.48 is less than the critical F value of 2.04. Hence the null hypothesis of no significance was accepted. Therefore, it was concluded that the differences in the mean achievement scores of both gender taught algebra using the experiential instructional approach is not significant.

4. Discussion

The results from the study indicated that students taught Algebra using experiential approach achieved significantly better than students taught using the talk and chalk lecture method. In other words, the experiential group passed Algebra more than the control group taught with the lecture method. The findings of this study agreed with the earlier research such as Omotayo and Olaleye [21], and Musa and Bolaji [18], where the experiential teaching proved better than the conventional teaching method. The significant effect observed between the treatment and control groups in this study could be attributed to learners in the treatment group being practically and actively involved in meaningful activities, where their teachers acted as facilitators of learning. Shana and Enas recommended that students be given ample opportunity to engage in practical teaching experiences in secondary schools [22]. Also observed by Alkan, who worked on the effects of experiential instructional approach on Chemistry students' achievement and scientific process skills in high schools in Turkey, experiential instructional approach is an effective approach on academic achievement and scientific process skills with well-structured activities appropriate to concrete experiential observations [23]. Alkan said that in experiential instructional approach, students were fully involved, involvement is important if students must learn effectively. From this, one could infer that students in the experiential group of this study advanced in level of understanding as they apply their own understanding and skills in solving problems in Chemistry. This showed that experiential instructional approach cuts across even subject areas.

Table 4 showed the effect of experiential approach on the mean performance scores of both gender. The findings indicated that male students' score in the Algebraic test is higher than those of their female counterpart. The test of significance revealed that the difference in their achievement scores is very insignificant. The findings of this study did not agree with the earlier studies who's arguments favours females [10,19]. This study has dispelled the argument by showing that males achieved more than the females. Breda, Jouini and Napp in their study also found that boys have stronger intention to pursue mathematics related careers than boys [24]. Most importantly both gender were favored and observed to progress smoothly during the experimental session and through their scores. The implication is that experiential instructional approach is good for all students and should be used to teach mathematics and other subjects. As opined by Envision Experience, in experiential instructional approach, students learn more quickly and retain information when the subject matter pertains to their personality and doing makes learning extremely personal [25]. Students interact with information, it becomes real to them. Each students' learning experiences is guided by their unique perspective, they interact with information and the task in different ways and may have different results because experiential instructional approach emulates real society. These are the basis for the favorable achievement of both gender with the experiential instructional approach.

Table 5 also revealed that there is no interaction between gender and teaching method on students' performance in Algebra. The summary also indicated that the effect of experiential teaching method is higher than the conventional lecture method at the two levels of gender in fostering achievement. Treatment interaction generally implies that different learners with different characteristics may profit more from one type of instructional approach than from another and therefore it may be possible to find the best match of learners characteristics and instructional approach in other to maximize learning outcome or whichever dependent variable that is involved. Although the goal of research in treatment interaction is to find significant interaction between alternative treatments and personal variable, it must be emphasized here that any approach which yields a superior no-interaction is cost effective and better in all ramification. With this in mind, one may begin to appreciate the worth of experiential approach both in its superiority over the conventional approach and its ability to accommodate both males and females in fostering achievement. This is because according to Rosenberg and Christman, experiential learning provides students with the opportunity to apply the curricular knowledge gained from the academic coursework to real world situations and challenges. It creates environment where learners can apply existing knowledge while developing new knowledge and skills in a practical context [26]. It deepens the learners understanding of contents subject matter and cultivate skills that can be applied in various environments or employment setting.

5. Conclusion

The experiential approach as a teaching approach is significantly better than the conventional teaching approach in motivating students' achievements in algebra. With the experiential approach males show higher achievement than female, the difference in the mean achievement of both gender taught algebra using experiential method was insignificant.

There was no significant interaction between gender and teaching approaches on students' achievement in algebra. For both males and females, the experiential approach is superior to the conventional package in fostering achievement in algebra.

This study certifies the experiential approach and recommends it to teachers in secondary schools to enhance academic achievement of students.

Recommendation

Based on the results of the research the study made the following recommendations:

- Secondary school tutors are to be encouraged to adopt experiential approach as one of the teaching methods.
- State and Federal governments including the professional bodies like Science Teachers Association of Nigeria (STAN) should encourage and sponsor in-service training for teachers to learn the tenets of experiential teaching.
- The government in collaboration with curriculum developers and subject specialists should review the existing teachers' training curriculum and integrate the basic tenets of the experiential approach in the curriculum.
- More researches on experiential instructional approach should also be encouraged by government and professional bodies to enhance academic achievement of students in Algebra.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all the study participants before the commencement of the study.

References

[1] Basher, N., Abubakar, K.O. & Garba B.K. The Importance of Mathematics Teaching and Learning; Process and Prospect: Oxford. Oxford University Press. 2016.

[2] Crowe, A. Why Math is Important. 2022. Retrieved from prodigygame.com on 12th April 2024.

[3] Anugwo, M. N. Science, Technology, Mathematics, Society and Problems. Afikpo: Vita Mater Press.2022.

[4] Al-Khwarimi (820CE) Al-Jabriwaal –Muquabalah: A research on its content, writing methodology and elementary Algebra.

[5] West African Examination Council (2019-2022). Chief examiners report on mathematics. Lagos WAEC., 2022.

[6] Iji, E. Emiakwu N.O. & Utubaku I.S. The Learn-by-Doing approach, effect and importance. Education Research and Review. Academic Journals Organizations IERR. 2015; 3(1)

[7] Bakke, M. & Igharo O. A Study on the Effects of Guided Inquiry in Teaching Method on Students Achievement in Logic. The International Research Journal, 2013;1 (2); 1: 227-7471.

[8] Ajai, J.T & Imoke I.I. Gender difference in Mathematics achievement and retention scores. A case of problem based learning method. International journal of research in education and science (IJRES), 2015;1 (1):45-50.

[9] Iji, Ogbe & Uka. The Role of Mathematics in Science and Technological Development: University Press, Lagos State University, 2014.

[10] Shafi, M. (2010) "Ethical Relativism versus Ethical Absolutism: How Should an Ethical Business Corporation Behave?" Proceedings of CBETM 2010: Singapore, 26-28 February, 2010.

[11] Elaine, M.K. The teaching of mathematics for national development. New Delhi. Sterling Publishers. 2012.

[12] Galadimma & Okogbenin. Effects of Gender and Teaching Methods on Science Process Skill Acquisition among Senior Secondary School Students. International Journal of Education University of Nigeria Nsukka. 2012.

[13] Kulbir S.S. The teaching of mathematics: Stenling publishers New York. 2012.

[14] Diem K.G. The Learn-by-doing Approach to life skill development Rutgers co-operative research and extension. NAES of New Jersey Rutgers. The State University of New Jersey Educational Research and Review, 2012; 3(1).

[15] Azuka B. The use of mathematical game in Nigerian Secondary Schools. A paper presented at MAN Conference at Katsina, 2013.

[16] Etukudo, A.A. Mathematics and science. Education Digest XLII: 2013; 19(5) 40-42.

[17] Iji, C.I., Emaikwu, Sunday Oche. & Utubaku, R. U. Effect of problem-based learning on senior secondary school students' achievement in trigonometry in Northern educational zone of Cross River State, Nigeria. IOSR Journal of Mathematics (IOSRJM), 2015; 11 (1), 16-25.

[18] Musa & Bolaji. Effect of gorband on students achievement and interest in algebra. Unpublished M.Ed Thesis. Ebonyi State University, Abakaliki. 2015.

[19] Kurumeh, & Iji. Effects of Cuisenaire Roads Approach on some Nigeria Basic Pupils achievement in Decimal Fractions. Educational Research and Review, 2009; 3(1)33a-343.

[20] Adeniyi, A. & Salami, S. Effects of personalized system of instruction on students' academic achievement in chemistry, Med. Well Journals.pakistan Journals of Social Science, 2015; 4(1)132-136.

[21] Omotayo, O. & Olayeye, D. Affective science teaching: A method to enhance qualitative science education in Nigeria. Pakistan Journal of Social science, 2008; 3(4); 323-326.

[22] Shana, Z. & Enas, S.A. Science practical, work and its impact on students' science achievement. Journal of Technology and Science Education. 2020; 10(2). 190 – 215.

[23] Alkan, F. Experiential Learning: It's effects on achievement and scientific process skills. Journal of Turkish Science, 2016; 13 (2) 15-26.

[24] Breda, T., Jouini, E. & Napp, C. Gender differences in the intention to study mathematics increase with match performance. Nature Communications, 2023; 14(3664). 1-12.

[25] Envision Experience. The benefits of experiential learning for students. World Strides, 2023. Retrieved from www.envisionexperience.com

[26] Rosenberg S. & ChristMary, E. What is Experiential Learning and Why is it Important? New Hampshire University: Peregrine, 2023.