



## Effect of E-Learning on Students' Emotion and Achievement in Mathematics Among Senior Secondary School Students in Oyo State

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### Abstract

This study investigated the effect of E-learning on emotion and achievement in Mathematics in Senior Secondary Schools in Afijio Local Government, Oyo State. The study employed the quasi-experimental design. The population for this study was forty secondary school students in the study area. Four schools were selected using simple random sampling. Eighty students comprise of forty males and forty females were selected as sample. The Instruments used for this study were Mathematics Achievement Test and Emotion Inventory Test which were validated by experts with reliability coefficient of 0.82 and 0.67 respectively using the Cronbach alpha. ANCOVA was used for data analysis. Results showed that there is a significant difference between the pre-emotion and the post-emotion scores; there is a significant difference in e-learning and the traditional method on post intervention scores on achievement in mathematics; there is no significant difference between the male and females pre-emotion and post-emotion scores given the intervention on mathematics; and there is no significant difference between the males and females achievement scores given the intervention on mathematics. Based on the findings, it was recommended among others that workshop should be organized for in-service mathematics teachers on the need for use of E-learning platforms to teach mathematics.

**Keywords:** E-learning, Emotion and Achievement

### Introduction

Mathematics is one of the branches of science that contributed greatly to the advancement of science and technology. According to Abimbade (2012), mathematics involves the activities of human endeavours but in general terms, it is a discipline that helps to develop the scientific thinking ability of an individual. The basic objectives of mathematics in secondary schools which are the ability to recognize numbers and perform basic functions, data collection and interpretation, critical thinking, and problem-solving among others today are no longer realized (Goshit, 2016). One of the reasons for this may be due to the poor foundation on students in mathematics which leads to the students' poor performance in it as a subject. Another reason for students' poor performance may be peer group influence (Briggs, 2017).

Tavangarian, Leybold, Nölting, Röser and Voigt (2014) opined that E-learning is the adoption of electronic media to facilitate teaching and learning. It utilizes technology to deliver information embedded in educational material to learners situated in diverse geographical areas. E-learning is a substitute method for teaching and learning. It veers away from the conventional classroom lectures (Herrington, Reeves & Oliver, 2010). Alavi and Leidner (2011) conceptualized E-learning as a virtual learning

environment where different forms of information technologies are used to mediate between the learner and the instructor. E-learning attempts to shift the focus of the educational environment away from the physical teacher-student environment while disseminating information. Without regards to distance, instructors utilize new and improved web-based technologies to plan and structure teaching materials (Clark & Mayer, 2018).

According to Clark and Mayer (2018), e-learners are subjected to more critical challenges when compared to conventional learners. This is so because the efforts which should have been put in by instructors in motivating and instilling discipline in learners are transferred to the e-learner in an E-learning setting. Stated succinctly, the responsibility of inspiring and encouraging discipline is transferred from the conventional lecture-bearing instructor to the learner himself (Liaw, 2018). E-learning students are themselves managers and students. They actively manage their learning process while the instructor sets the guidelines (Downes, 2015). E-learning students see this as a barrier and it frustrates their learning efforts. The frustration either leads to a high drop-out rate or reduced learner satisfaction (Liu, Magjuka, Bonk & Lee, 2016).

Emotions are person's state of mind; others may refer to it as the instinctive response of the mind,



and however show a drift to other meaning which relates to gender in relation to feelings. Akinlade (2004) suggested that emotion is often mistaken as a deterrent that impedes effective teaching and learning. However, it is likely that emotion plays a far more dynamic role in learning than merely inhibiting rational thought and reason. An understanding of the nature of emotions in the context of learning may assist the learning process of all human actions and reasoning. Emotions may facilitate successful actions or reasoning at all are levels of achievement. Aktas, Bulut & Yuksel (2011) showed that gender gaps in mathematics were generally small, while the differences were greatest in the areas of measurement, number and operations and mathematics. Barbalet, J. (2012) Stated that there was a mass failure as WAEC May/June examination results, according to (2018) out of 1,692,435 candidates that sat for the examination, 791,227 candidates representing 46.75% obtained 6 credits and above, just as a total of 982,472 candidates representing 58.05% obtained 5 credits and above. In addition, he stated that 1,148,262 candidates, representing 67.84% obtained credit and above in 4 subjects, while 1,293,389 candidates, representing 76.42% obtained credits and above in 3 subjects.

Learning performance as regards e-learning is possibly lower than a crammed educational style based on objectivist educational philosophy, with the exception of a strategic approach relating to the efforts and studies for the pleasure of the self-learner. Lee et al. (2017) points out that the teacher is available as an assistant and guide for learning, not as a unilateral knowledge source and messenger. Learners enjoy e-learning by selecting knowledge and using it practically (Thatcher & Pamela, 2010). E-learning describes using information and communication technology (ICT) towards improving learning within educational training. Nevertheless, e-learning involves the use and application of a variety of tools and techniques, for instance, e-mails, websites, blogs, social and business media, and being able to access program supplies on the internet whilst carrying out programs delivered entirely on the internet (Heeger, 2010). The use of e-learning cannot be over emphasized in the modern world, hence this study, the impact of e-learning on academic performance of mathematics students in secondary schools in Afijio Local Government Area, Oyo state, Nigeria.

### Statement of the Problem

This study was necessitated by the deplorable state of the educational system in Nigeria especially mathematics education due to the inadequate modern teaching-learning facilities and infrastructures. Schools in Oyo state use the face-to-face classroom teaching and learning method but the advent of the technology age has brought about a gadget that can improve such experiences. Various learning approaches are being put in place to compensate for the problems occasioned by this traditional learning paradigm. One of them has been electronic learning (e-learning), which has the potential to provide opportunities for reflective and integrating learning outcomes. This approach when utilized provides the students with adaptive personalized electronic learning known as “e-learning” experiences because it is a practical approach that can be replicated by the students to improve the learning outcomes especially in mathematics which is the focus of this study. Many Students see e-learning platforms as very difficult platforms to learn mathematics and have poor achievement despite the effort of the teachers to enhance the learning with technology, as a result most students avoid failing mathematics in external examinations like West African Examination Council (WAEC) and National Examination Council (NECO). There are different innovations that are being applied in the delivery of curriculum content to students. The use of CAI (Computer Assisted Instruction) brings about improvement in students’ academic achievement, speeds up learning rate, enhances better understanding and encourages the development of a better attitude toward mathematics. There is a need to find out, whether the uses of E-learning will produce any difference in the achievement of students in mathematics. Therefore, this study investigated the effect of E-learning on students’ emotions and achievements in mathematics using Afijio Local Government of Oyo State.

### Purpose of the Study

The study examined the influence of e-learning on emotion and achievement in construction mathematics in the Senior Secondary School in Afijio Local Government, Oyo state. Specifically, the study sought to determine the:

- i. mean and emotional scores of students taught mathematics through e- learning and those taught using the traditional method.



- ii. mean and achievement scores of students taught mathematics through e- learning and those taught using the traditional method.
- iii. mean and emotional scores of male and female students taught mathematics through e- learning.
- iv. mean and achievement scores of male and female students taught mathematics through e- learning.

- ii. Awe High School, Awe with a total number of twenty-two (22) students both males and females.
- iii. Trinity Missionary College, Fiditi with total numbers of eighty-three (83) students both males and females.
- iv. Blue cross comprehensive High School, Ilora with total number of one hundred and twenty-five (125) SS1 students both males and females

**Hypotheses**

H<sub>01</sub>: There is no significant difference in the mean emotional scores of students taught mathematics through e-learning and those taught using the traditional method.

H<sub>02</sub>: There is no significant difference in the mean achievement scores of students taught mathematics through e-learning and those taught using the traditional method.

H<sub>03</sub>: There is no significant different in the mean emotional scores of male and female students taught mathematics through e-learning.

H<sub>04</sub>: There is no significant difference in the mean achievement scores of male and female students taught mathematics through e-learning.

**Methodology**

The study employed the quasi- experimental setting of non-equivalent (pre-test and post- test) and control group. The targeted population for this research is made up of forty (40) secondary school’s students in Afijio Local Government Area of Oyo state which includes both public and private secondary schools. There are 40 secondary school in Afijio Local Government, and out of the forty (40) we have twenty-three (23) for public schools with the population of three thousand four hundred and thirteen (3,413) students in SS1 and seventeen (17) private schools with a total number of two thousand one hundred and eighty-six (2,186) students in Afijio local government Local Government Area of Oyo State. The total population is five thousand five hundred and ninety-nine (5,599) students.

The four selected schools out of the 40 secondary schools in Afijio Local Government using sampling random sampling technique are.

- i. Akinmorin Grammar School, Akinmorin with a total number of one hundred and five (105) SS1 students both males and females.

The total numbers of students are three hundred and thirty-five (335).

The research could not go round the (40) senior secondary school in the Local Government, in order to provide a sampling frame, the researchers conducted multiage random sampling techniques at two level using the balloting techniques the name of the schools were folder in a pieces of paper in two empty balloting, one for the public schools and the other balloting for the private schools and it was randomly selected, two school selected from each balloting making four (4) schools out of the (40) using the sampling random selection and uses them as sample populations. Eighty (80) students comprise of forty (40) males and forty (40) females are selected for this exercise, out of the three hundred and thirty-three (335) students in the four selected Secondary Schools in local government under study. Twenty (20) students were sampled from each of the selected, ten (10) females given a total number of twenty (20) students from each school. The random sampling technique is used for the selection of the above four secondary schools. The simple random sample is a sample in which every member of the population has an equal chance of being chosen.

The instruments used for this study was the Mathematics Achievement Test (MAT) which comprised twenty-five items; with options A to D and only one response is correct and the Emotion Inventory Test (EIT) on mathematics satisfied the four-point Likert Scale and comprises twenty-five. The EIT was based on the four (4) point scale liker scale of strongly agreed (AS), Agreed (A), Disagreed (D) and strongly disagreed (SD). The items scores are rated as follows for positively framed questions 4 marks for AS, 3 marks for A, 2 marks for D and 1 mark for SD for negative frame questions, I mark for AS, 2 marks for A, 3 marks for D and 4 marks for SD. In the achievement test which is the (MAT), 4 marks are allocated to the corrected answers each among the thirty (30) objective questions given a total



of 100 marks. MAT and EIT are for 100 marks and rated as low to be 25 marks, moderate to be 45 marks and high to be 75 marks.

The instruments were submitted to two (2) experts in the field of test and measurement evaluation for face and content validity. The correction and criticism were strictly adhered to for the final production of the instrument. The reliability of the items was computed using the Cronbach alpha formula. The test was administered once on pilot samples of twenty students of Sped International School, Oyo, Oyo State which is not part of the study. A reliability test using the Cronbach alpha formula revealed a reliability coefficient of MAT 0.82 and 0.67 for EIT were obtained which was considered adequate for the study.

The researchers visited the sample schools and introduce themselves to the principals, teachers, and students as education research on the topic influence of E-learning on students' emotions and

achievement in mathematics. The researchers used (45 minutes) per day to teach each group, the researchers used the chalkboard method and the mathematical set for the teaching in the control group while the experimental group was taught using E-learning platform provided by the schools. The attention of sampled students was drawn to the test instruction. The answer scripts were collected immediately after the time allocated for the pre-test is over. Then a post –test will be administered to both the experimental group and the control group after the treatment (teaching). Analysis of Covariance (ANCOVA) was used to test the hypotheses.

**Results**

The result from the analysis of data for this study is presented according to the research hypotheses formulated.

**Hypotheses Result**

**Table 1: ANCOVA Result of the Mean Emotion Scores of Students taught Mathematics through E-learning and those taught using the Traditional Method**

Dependent Variable: Post Emotions

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	342.873 <sup>a</sup>	4	85.718	.797	.531	.043
Intercept	10402.091	1	10402.091	96.742	.000	.577
Pre-Emotions	21.679	1	21.679	.202	.655	.003
Treatment	45.266	1	45.266	.421	.519	.006
Gender	89.763	1	89.763	.835	.364	.012
Treatment * Gender	204.285	1	204.285	1.900	.172	.026
Error	7634.233	71	107.524			
Total	439386.000	76				
Corrected Total	7977.105	75				

Preliminary checks were conducted to ensure that there was no violation of the assumption of normality, linearity, homogeneity of variance, homogeneity of regression slopes and reliable measurements of the covariate. After adjusting for pre-emotion between the e-learning and the traditional method on post intervention scores on emotion in mathematics with  $F(1,71) = 1.900$ ,

$P=0.172$ , partial eta squared = 0.26. The results showed that there is a significant difference between the pre-emotion and the post emotion scores as indicated by partial Eta square value of 0.012. Therefore, we reject the null hypothesis that there is no significant difference in the mean emotional scores of students taught mathematics through e-learning and those taught using the traditional method

**Table 2: ANCOVA Result of the Mean Achievement Scores of Students taught Mathematics through E-learning and those taught using the Traditional Method**

Dependent Variable: Post Achieve

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4079.951 <sup>a</sup>	4	1019.988	5.856	.000	.248
Intercept	2326.912	1	2326.912	13.359	.000	.158
Pre-Achievement	378.582	1	378.582	2.173	.145	.030
Treatment	2665.154	1	2665.154	15.300	.000	.177



Gender	475.703	1	475.703	2.731	.103	.037
Treatment * Gender	472.394	1	472.394	2.712	.104	.037
Error	12367.457	71	174.190			
Total	286817.000	76				
Corrected Total	16447.408	75				

Preliminary checks were conducted to ensure that there was no violation of the assumption of normality, linearity, homogeneity of variance, homogeneity of regression slopes, and reliable measurement of the covariate. After adjusting for the pre-intervention scores, there was a significant difference in the achievement of e-learning and the traditional method on post intervention scores on achievement in mathematics with  $F(1,71) = 2.712$ ,

$P=0.104$ , partial Eta square 0.37, there is a significant difference in e-learning and the traditional method on post intervention scores on achievement in mathematics as indicated by a partial eta square value 0.37. Therefore, we reject the null hypothesis that there is no significant difference in the mean achievement scores of students taught mathematics through e-learning and those taught using the traditional method.

**Table 3: ANCOVA Result of the Male and Female Mean Emotional Scores of Students Taught Mathematics through E-learning**

Dependent Variable: Post Emotions

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	31.649 <sup>a</sup>	2	15.824	.146	.864	.008
Intercept	5069.449	1	5069.449	46.889	.000	.559
Pre-Emotions	19.549	1	19.549	.181	.673	.005
E-learning	.000	0	.000	.000	.000	.000
Gender	12.319	1	12.319	.114	.738	.003
E-learning * Gender	.000	0	.000	.000	.000	.000
Error	4000.251	37	.115			
Total	235376.000	40				
Corrected Total	4031.900	39				

Preliminary checks were conducted to ensure that there was no violation of the assumption of normality, linearity, homogeneity of variance, homogeneity of regression slopes and reliable measurements of the covariate. After adjusting for pre-intervention scores, there is no significance difference in the emotion between e-learning scores

on male and female emotion in mathematics with  $F(1,37) = 0.114$ ,  $P=0.738$ , partial Eta square = 0.03. Therefore, we accept the null hypothesis that there is no significant difference between the male and females' pre-emotion and post-emotion scores given the intervention on mathematics as indicated by a partial Eta squared value 0.000

**Table 4: ANCOVA Result of the Male and Female Mean Achievement Scores of Students Taught Mathematics through E-learning**

Dependent Variable: Post-Achievement

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1072.021 <sup>a</sup>	2	536.010	3.508	.040	.159
Intercept	144.156	1	144.156	.944	.338	.025
Pre-Achievement	1066.396	1	1066.396	6.980	.012	.159
E-learning	.000	0	.000	.000	.000	.000
Gender	39.082	1	39.082	.256	.616	.007
E-learning * Gender	.000	0	.000	.000	.000	.000
Error	5652.754	37	152.777			
Total	179253.000	40				
Corrected Total	6724.775	39				

Preliminary checks were was no violation of the assumption of normality, linearity homogeneity of

variance, homogeneity of regression slopes, and reliable measurements of the covariate. After



adjusting for pre-intervention scores on achievement in mathematics, there is no significant difference in the male and female students achievements taught mathematics using e-learning with  $F(1,37) = 0.256$ ,  $P=0.616$ , partial Eta square = 0.07. Therefore, we accept the null hypothesis that there is no significant difference between the males and females' achievement scores given the intervention on mathematics as indicated by partial Eta Square of 0.000.

### Discussion of Findings

The results on table 1 revealed that there is a significant difference between the pre-emotion and the post emotion scores of students in mathematics. It indicates that students' emotion should be considered as part of students' characteristics to be considered before teaching-learning process can be embarked upon. These results are in line with the positions of Ajala (2018), Kozma (2011) and Azuka (2015) that emotional intelligence competencies are not innate talents, but rather learned capabilities that must be worked on and developed to achieve outstanding performance.

Table 2 revealed that there is a significant difference in e-learning and the traditional method on post intervention scores on achievement in mathematics. The emergence of covid-19 exposed the educational world to beauty of e-learning which gives improvement to the teaching and learning of education especially, mathematics education. This result agreed with the finding of Okon and Jacob (2012) who in previous studies found out those students taught using computer performed better than their counterparts taught with any other teaching method.

Furthermore, table 3 revealed that there is no significant difference between the male and females' pre-emotion and post-emotion scores given the intervention on mathematics. It translates that gender has no relationship with emotion especially towards the study of mathematics. Goshit (2016) posited that the problem of poor academic achievement of students to low level of Emotional Intelligence (EI) among Students which is in line with the result of this study.

In conclusion, table 4 showed that there is no significant difference between the males and females' achievement scores given the intervention on mathematics. Gender is not a barrier in the

teaching and learning of mathematics and this is corroborated by Kozma (2011).

### Summary of Finding

The following are the summary of the finding;

- there is a significant difference between the pre-emotion and the post emotion scores
- there is a significant difference in e-learning and the traditional method on post intervention scores on achievement in mathematics
- there is no significant difference between the male and females' pre-emotion and post-emotion scores given the intervention on mathematics
- there is no significant difference between the males and females' achievement scores given the intervention on mathematics.

### Conclusion

The statistical analysis of the result of the study provides empirical evidence that the used of E-learning platform improves students emotion and achievements in mathematics, more than the use of traditional method. And so, students taught mathematics with the use of E-learning platform perform better than their counterparts taught mathematics using the traditional method. Both the male and female in the experimental group perform moderately in the Mathematics Achievement Test (MAT) and but the male the Emotion Inventory Test (EIT) is higher than their female counterpart. This means that gender have no significant effect on students' achievement in Mathematics but only slightly differ in term of emotion. Hence the use of E-learning platform is to improve the teaching and learning of Mathematics in our secondary schools and any level.

### Recommendations

Base on the findings of this study the following recommendation are made:

- Mathematics teachers should use a variety of teaching methods and make deliberate effort to embrace the emotions to improve the teaching and learning in mathematics classroom.
- Workshop and seminars should be organized by stakeholders in mathematics education for in service mathematics teachers on the need for use of E-learning platform.



- iii. Time table should be organized considering the time table when students are calmed especially in morning to avoid emotional stress when teaching mathematics.
- iv. Male and female students were affected positively evenly by the use of E-learning platform; therefore, mathematics teachers should employ this strategy to improve in mathematics at senior secondary school level in particular and any level of education.

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