

## Emotional Intelligence, Reasoning Ability and Self Efficacy as Predictors of Retention of Students in Trigonometry Among Senior Secondary Schools in Katsina-State, Nigeria.

ABDULLAHI, U

&

YAKUBU, S. I.

Department of Science Education, Faculty of Education, Federal University Dutsin-ma, Katsina State, Nigeria.

[Umarabdullahi579@gmail.com](mailto:Umarabdullahi579@gmail.com), 0810352820

### Abstract

*This study investigated the relationship of emotional-intelligence, reasoning ability and self-efficacy as predictors to retention ability of students in trigonometry among Senior Secondary School Students in Katsina State, Nigeria. Survey research involving correlation design was used. 374 sampled students were used selected from a total population of 16,141 students in the study area using stratified simple and random sampling technique. Trigonometric retention Test (TRT), Trigonometric Emotional-Intelligence Scale (TEIS), Trigonometric Reasoning Ability Scale (TRAS) and Trigonometric Self-Efficacy Scale (TSES) with reliable co-efficient of  $(r) = 0.87, 0.91, 0.89$  and  $0.87$  respectively were used as instruments for data collection in this study. The data collected were analyzed using mean and standard deviation in order to analyze the three (3) research questions. However, Multiple correlation statistic at  $p \leq 0.05$  level of significance was also used to test the three (3) formulated hypotheses. Result showed that there exist a very high positive correlation (0.96) among emotional intelligence, reasoning ability, self efficacy and retention ability of students in trigonometry. By implication, it means that, for any increase or decrease in terms of emotional intelligence, reasoning ability and self efficacy of students in trigonometry, will also lead to an increase or decrease in terms of retention ability of students in trigonometry by 97%. Hence, emotional intelligence, reasoning ability and self efficacy of students serve as predictors of retention ability of students in trigonometry in particular and mathematics in general. Based on the findings of this study, the researcher recommended that: teachers, students, parents and educational planners should consider emotional intelligence, reasoning ability and self efficacy of students in teaching and learning for effective teaching and learning of trigonometry to take place in order to improve students' retention ability.*

### Introduction

Mathematics is a bedrock of all sciences. It is compulsory for all secondary school students and a pass at credit level in ordinary level mathematics examination is one of the requirements for gaining admission in to any tertiary institution to study science related and mathematics courses. Meanwhile, every man needs a certain knowledge in mathematics in order to survive in this highly technological society. Hence, the use of mathematics knowledge spreads across all spheres of human endeavor and as such, there is no subject, field of study or any profession that does not make use of some form or order of mathematics. Therefore, mathematics education is a dynamic instrument that can be used to bring about positive changes in any nation and in the life of its citizens. Hence, recognition attached to it cannot be over emphasized (Musa, 2016).

Unfortunately, despite all the above importance of mathematics, students' retention ability in the subject in both internal and external examinations has remained constantly poor (Adolphus, 2011). However, West African Senior Secondary Certificate Examination (WASSCE) Mathematics Chief Examiners'

Report reported that questions on trigonometry were poorly attempted by candidates. Also, Udoh (2011) reported that many students find it difficult to solve mathematical problems among which is the trigonometric problem which no doubt constitutes an educational problem. Table 1 represent mathematics retention ability of students in WASSCE.

**Table 1: Retention Ability of Students in Mathematics WASSCE in Katsina State (2013-2018).**

| Years | No. Registered | No. passed with credit | No. with pass | No. failed |
|-------|----------------|------------------------|---------------|------------|
| 2013  | 15,010         | 6004 (40%)             | 4803 (32%)    | 3587 (24%) |
| 2014  | 15,250         | 6405 (42%)             | 5338 (35%)    | 3355 (22%) |
| 2015  | 15,500         | 6665 (43%)             | 5270 (34%)    | 3100 (20%) |
| 2016  | 15,750         | 6930 (44%)             | 5670 (36%)    | 2993 (19%) |
| 2017  | 15,900         | 6837 (43%)             | 6042 (38%)    | 2226 (14%) |
| 2018  | 16,020         | 6408 (40%)             | 6248 (39%)    | 1652 (11%) |

**Source:** Test and Statistics, Ministry of Education, Katsina State (2019).

Bhat, (2016) had identified emotional intelligence, reasoning ability and self efficacy of students as some of the major factors responsible for poor retention ability of students. The term emotional intelligence is the ability to monitor, detect, sense, create and discriminate one's own and others feelings and emotions and guide one's thinking and action (Oyenuga & Lopez, 2012). Reasoning ability is the ability to accurately understand a situation, acknowledge their subjective interpretation of the situation, and reach a logical conclusion based on this supporting knowledge (Lavins, 2011). However, the term self efficacy is the belief in one's ability to perform a specific task successfully. Based on this, the researchers investigated the relationship that exist among emotional intelligence, reasoning ability, self efficacy and retention ability of students from which predictions could be made. Therefore, this study investigated the relationship of emotional-intelligence, reasoning ability, self-efficacy as predictors to retention ability of students in trigonometry among senior secondary school in Katsina state.

### The Problem

Questions on trigonometry were poorly attempted by the candidates that contributed toward poor retention ability of students in mathematics in general (WASSCE Mathematics Chief Examiners' Reports, 2018). However, emotional intelligence, reasoning ability and self efficacy of students had been identified as some of the major factors responsible for poor performance of students. Based on this, the researchers investigated the significant relationship that exist among emotional intelligence, reasoning ability, self efficacy and retention ability of students from which predictions could be made to see if it would solve this problem or not.

### Research Questions

The following research questions guided the conduct of this study.

1. Is there any relationship among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of students in trigonometry?

2. What is the relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of male students in trigonometry?
3. To what extent of the relationship exist among emotional intelligence, reasoning ability, self- efficacy and retention ability scores of female students in trigonometry?

### Hypotheses

The following null hypotheses were formulated and tested at  $p \leq 0.05$  levels of significance.

H<sub>01</sub>. There is no significant relationship among emotional intelligence, reasoning ability, Self efficacy and retention ability scores of students in trigonometry.

H<sub>02</sub>. There is no significant relationship among emotional intelligence, reasoning ability, Self efficacy and retention ability scores of male students in trigonometry.

H<sub>03</sub>. There is no significant relationship among emotional intelligence, reasoning ability, Self efficacy and retention ability scores of female students in trigonometry.

### Methodology

The researcher used survey research of correlation design. This is because, it is a research that enables the researcher to determine relationship among the variables in the topic of the study from which predictions can be made. The population of the study was 16,141 students consisted of 11,566 male and 4,575 female. The details of the population distribution is presented in Table 2

**Table 2: Population Distribution of the Study.**

|    | Zones No. Of |    | No. of Schools | Number of S.S.II Students |        | Population Size |
|----|--------------|----|----------------|---------------------------|--------|-----------------|
|    | LGAs         |    |                | Male                      | Female |                 |
| 1. | Daura        | 5  | 13             | 2,001                     | 812    | 2,813           |
| 2. | Mani         | 4  | 11             | 1,543                     | 674    | 1,217           |
| 3. | Katsina      | 6  | 15             | 2,062                     | 987    | 3,049           |
| 4. | Dutsin-ma    | 5  | 12             | 1,598                     | 529    | 2,127           |
| 5. | Kankia       | 5  | 13             | 1,072                     | 215    | 1,287           |
| 6. | Malumfashi   | 3  | 11             | 1,188                     | 500    | 1,588           |
| 7. | Funtua       | 6  | 15             | 2,102                     | 958    | 3,060           |
|    | Total        | 34 | 90             | 11,566                    | 4,575  | 16,141          |

**Source:** Test and statistics, Ministry of Education, Katsina (2018).

A sample size of 374 students was used in this study in line with Research Advisor (2006) Table for Determination of Sample Size Guidelines and the technique was as follows: There were 7 Education Zones in the state under study located in the headquarters of the old 7 LGAs that were in existence when the state was created in 1987 out of which 9 schools and their corresponding LGAs were selected as sample schools in line with Musa (2016) using stratified and simple random sampling technique. This was done by picking nine (9) playing cards containing the names of the nine (9) sample schools from a total of ninety (90) playing cards each containing name of only one school in the 7 Education Zones of the 34 LGAs in the state. As a result of the stability nature of S.S.II students in all the 9 sample schools, they were used as sample students consisted of male's and female's. The details of the sample distribution is presented in Table 3.

**Table 3: Sample Distribution by Zones, LGAs, Schools and Gender.**

| Zones<br>Name of LGAs | Name of Schools              | Number of students |        | Sample Size. |
|-----------------------|------------------------------|--------------------|--------|--------------|
|                       |                              | Male               | Female |              |
| Kankia                | Musawa G.S.S Tsuntsaye       | 35                 | 11     | 46           |
| Daura                 | Zango G.S.S Baure G          | 41                 | 11     | 52           |
| Malumfashi            | Kankara G.S.S Gurbi          | 39                 | 12     | 51           |
| utsin-ma              | Dutsin-ma G.S.S Karofi       | 41                 | 12     | 53           |
| Funtua                | Danja G.S.S Kahutu and Tsigi | 46                 | 22     | 68           |
| Katsina               | Katsina G.S.S Kayoki         | 48                 | 18     | 66           |
| Mani                  | Bindawa G.S.S Giremawa       | 30                 | 8      | 38           |
| Total                 |                              | 280                | 94     | 374          |

**Source:** Research Advisors (2006) Table for Determination of Sample Size Guideline.

## Instrumentation

### Data collection,

The following instruments were used:

Trigonometric Retention Test (TRT), Trigonometric Emotional Intelligence Scale (TEIS), Trigonometric Reasoning Ability Scale (TRAS) and Trigonometric Self Efficacy Scale (TSES) were used as instruments for data collection. TRT was an adapted version of WAEC and NECO standard sample trigonometric questions that were highly validated and found to be very reliable with an acceptable reliability index of 0.87 in order to measure retention ability of students in trigonometry. It consists of two sections. These are sections A and B. Section A contained respondents Bio-data while section B is made up of fifty (50) multiple choice items in trigonometry with four options lettered A to D to choose the correct answer selected.

TEIS was an adapted version of standard Cyber-Shrink emotional intelligence scale standardized by Nezami, Jerusalem and Schwarzer (2005) with acceptable internal consistency and test-retest attached reliability index of 0.91 in order to measure emotional-intelligence of students in trigonometry. It is a five points Likert scale and it consists of 5 components: self-control/self-awareness, emotionality/emotional management, well-being/self motivation, empathy and sociability/interpersonal skills. It also consists of two sections, these are section A and B. Section A contained respondents Bio-data while section B is made up of 24 items emotional intelligence scale on trigonometry with 5 possible options ranging from Strongly Agree (number 5) to Strongly Disagree (number 1). Each option carries weight in order of priority from 5-1 in emotional intelligence positive responses but from 1-5 in emotional intelligence negative responses.

TRAS was an adapted version of Dweck General Mathematics Ability Scale (2000) with acceptable internal consistency and test-retest attached reliability index of 0.89 in order to measure reasoning ability

of students. It also consists of two sections. These are sections A and B. Section A contained respondents Bio-data while section B is made up of 20 items testing five (5) components of reasoning ability mode namely: Proportional reasoning, Controlling variable, Probabilistic reasoning, Correlation reasoning and Combinatorial reasoning with 5 possible options ranging from Strongly Disagree (number 1) to Strongly Agree (number 5). Each option carries weight in order of priority from 5-1 in emotional intelligence positive responses but from 1-5 in emotional intelligence negative responses.

TSES was an adapted version of Persian Adaptation (Farsi) of the General Self-Efficacy Scale standardized by Nezami, Jerusalem and Schwarzer (2005) with acceptable internal consistency and test-retest attached reliability index of 0.87 in order to measure self-efficacy ability level of students. It also consists of sections A and B. Section A contained respondents Bio-data while section B is made up of 26 statements about students' confidence in doing things related to trigonometry with 5 possible options ranging from confident that you can do the task (number 5) to not confident that you can do the task (number 1) in order to measure self-efficacy of students in trigonometry. It has 4 components/contents namely: enactive mastery experience, vicarious experience, verbal persuasion and physiological/emotional state. Each option carries weight in order of priority from 5-1 in self-efficacy positive responses but from 1-5 in self-efficacy negative responses.

The validation of all the 4 instruments (TRT, TEIS, TRAS and TSES) was done by the four (4) lecturers, 3 from department of science education, faculty of education, A.B.U. Zaria each with minimum qualification of PhD and the other one from department of test and measurement, education resource centre, Katsina responsible for preparing and organizing S.S 2 past question papers. However, the instruments were pilot tested with a total number of 30 S.S.II students of G.D.S.S Yari which is one of the schools in the study population but not in the sampled schools. The pilot testing was conducted under a very strict condition and no student was allowed to go out with the question paper in order to avoid leakage of the items in the instruments which may in turn affect the final test result.

The reliability index of the instruments (TEIS, TRAS, TSES and TRT) were obtained using reliable statistics of Cronbach's alpha and Multiple Correlation Analysis by the aid of SPSS-16.0 version and found to be 0.91, 0.89, 0.87 and 0.87 respectively.

Descriptive and inferential statistics were employed in the analysis of the data collected. In order to analyze all the research questions, descriptive statistics of means and standard deviations were employed because they provide a simple summary used to describe the basic features of the data collected drawn from sample. To test the formulated null hypotheses, an inferential statistics Multiple Correlation Analysis was employed at  $p \leq 0.05$  levels of significance.

## Result

**Research Question One:** Is there any relationship among emotional-intelligence, reasoning ability, self-efficacy and retention ability scores of students in trigonometric?

For its analysis, a descriptive statistics of means and standard deviations were carried out and the result is presented in Table 4

**Table 4: Means and Standard Deviations on Emotional-Intelligence, Reasoning Ability, Self-Efficacy and Retention Ability Scores of Students in Trigonometry**

| Variables              | N   | Mean   | Std.Deviation | Std. Error | r value. |
|------------------------|-----|--------|---------------|------------|----------|
| Retention ability      | 374 | 63.944 | 6.13215       | 0.38783    | 1.000    |
| Self Efficacy          | 374 | 63.964 | 6.10111       | 0.38587    | 0.978    |
| Reasoning Ability      | 374 | 63.980 | 6.13205       | 0.38782    | 0.968    |
| Emotional Intelligence | 374 | 63.976 | 6.06954       | 0.38387    | 0.976    |

The result in Table 4 shows the mean performance scores, self efficacy, reasoning ability and emotional intelligence scores of students as 63.944, 63.964, 63.98 and 63.976 respectively with a r value of 0.97. This is an indication that students with positive self efficacy, reasoning ability and emotional intelligence may likely to also have high scores in terms of retention ability in trigonometry (positive correlation). But, we cannot conclude about its significant until its corresponding null hypothesis ( $H_{01}$ ) is tested.

**Null Hypothesis One ( $H_{01}$ ):** There is no significant relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of students in trigonometry.

To test this null hypothesis one ( $H_{01}$ ), an inferential statistic of Multiple Correlation Analysis was used as presented in Table 5.

**Table 5: Summary of Multiple Correlation Analysis on Self-Efficacy, Reasoning Ability, Emotional Intelligence and Retention Ability Scores of Male and Female Students in Trigonometry**

| Var. | R.S   | S.E   | R.A   | E.I   | Mean   | Std.D   | $\alpha$ . | P value | Decision    |
|------|-------|-------|-------|-------|--------|---------|------------|---------|-------------|
| R.S  | 1.000 |       |       |       | 63.944 | 6.13215 | 0.05       | 0.00    | Significant |
| S.E  | 0.978 | 1.000 |       |       | 63.964 | 6.10111 | 0.05       | 0.00    | Significant |
| R.A  | 0.968 | 0.978 | 1.000 |       | 63.980 | 6.13205 | 0.05       | 0.00    | Significant |
| E.I  | 0.978 | 0.975 | 0.976 | 1.000 | 63.976 | 6.06954 | 0.05       | 0.00    | Significant |

Significant at  $p \leq 0.05$ .

The result in Table 5 shows all the observed P values (0.000) at  $\alpha = 0.05$  with degree of freedom ( $df = 373$ ) and a r-value of 0.97 are significant. Therefore, the null hypothesis of no significant relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of students in trigonometry is rejected. Hence, there is significant relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of students in trigonometry. However, according to Cohen (1988) and Musa (2016), the direction is positive and the effect size of this significant relationship

that exist is strongly or very high correlation (0.974) such that for any increase or decrease in terms of emotional intelligence, reasoning ability and self efficacy of both male and female students in trigonometry will lead to also an increase or decrease in terms of retention ability of both male and female students in trigonometry by 97%.

**Research Question Two:** What is the relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of male students in trigonometry exist? For its analysis, a descriptive statistics of means and standard deviation carried out and the result is presented in Table 6.

**Table 6 Means and Standard Deviations on Emotional Intelligence, Reasoning Ability, Self-Efficacy and Retention Ability Scores of Male Students in Trigonometry**

| Variables              | N   | Mean    | Std.Deviation | Std. Error | r value. |
|------------------------|-----|---------|---------------|------------|----------|
| retention ability      | 280 | 62.2294 | 10.42472      | 0.79954    | 1.000    |
| Self Efficacy          | 280 | 62.2353 | 10.33366      | 0.79256    | 0.984    |
| Reasoning Ability      | 280 | 62.3000 | 10.24889      | 0.78605    | 0.976    |
| Emotional Intelligence | 280 | 62.2471 | 10.30758      | 0.79056    | 0.988    |

The result in Table 6 shows the mean performance scores, self efficacy, reasoning-ability and emotional intelligence of male students as 62.2294, 62.2353, 62.3000 and 62.2471 respectively with a r-value of 0.980. This is an indication that students with positive self efficacy, reasoning ability and emotional intelligence may likely to also have high scores in terms of retention ability in trigonometry (positive correlation). But, we cannot conclude about its significant until its corresponding null hypothesis ( $H_{02}$ ) is tested.

**Null Hypothesis Two ( $H_{02}$ ):** There is no significant relationship among emotional intelligence, reasoning-ability, self-efficacy and retention ability scores of male students in trigonometry. To test this null hypothesis two ( $H_{02}$ ), an inferential statistic of Multiple Correlation Analysis was used as presented in Table 7

**Table 7: Summary of Multiple Correlation Analysis on Self Efficacy, Reasoning Ability, Emotional Intelligence and Retention Ability Scores of Male Students in Trigonometry**

| Var. | R.S   | S.E   | R.A   | E.I   | Mean   | Std.D   | $\alpha$ . | P value | Decision    |
|------|-------|-------|-------|-------|--------|---------|------------|---------|-------------|
| R.S  | 1.000 |       |       |       | 62.229 | 10.4247 | 0.05       | 0.000   | Significant |
| S.E  | 0.984 | 1.000 |       |       | 62.235 | 10.3336 | 0.05       | 0.000   | Significant |
| R.A  | 0.976 | 0.990 | 1.000 |       | 62.300 | 10.2488 | 0.05       | 0.000   | Significant |
| E.I  | 0.988 | 0.991 | 0.993 | 1.000 | 62.247 | 10.3075 | 0.05       | 0.000   | Significant |

Significant at  $p \leq 0.05$ .

The result in Table 7 showed all the observed P values (0.000) at  $\alpha = 0.05$  with degree of freedom (df = 279) and a very small average mean difference of 0.02 were significant. Therefore, the null hypothesis

of no significant relationship among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of male students in trigonometry was rejected. Hence, there is significant relationship among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of male students in trigonometry. However, according to Cohen (1988) and Musa (2016), the direction is positive and the effect size of this significant relationship that exists is strongly or very high correlation (0.98) such that for any increase or decrease in terms of emotional intelligence, reasoning ability and self-efficacy of male students in trigonometry will lead to also an increase or decrease in terms of performance of male students in trigonometry by 98%.

**Research Question Three:** To what extent is a relationship among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of female students in trigonometry? For its analysis, a descriptive statistics of means and standard deviations were carried out and the result is presented in Table 8

**Table 8: Means and Standard Deviations on Emotional-Intelligence, Reasoning-**

**Ability, Self-Efficacy and Retention Ability Scores of Female Students in Trigonometry**

| Variables              | N  | Mean    | Std.Deviation | Std. Error | r value. |
|------------------------|----|---------|---------------|------------|----------|
| Retention ability      | 94 | 65.1250 | 2.95697       | 0.33060    | 1.000    |
| Self Efficacy          | 94 | 65.1000 | 2.91482       | 0.32589    | 0.968    |
| Reasoning Ability      | 94 | 65.2000 | 2.82126       | 0.31543    | 0.956    |
| Emotional Intelligence | 94 | 65.0875 | 2.94762       | 0.32955    | 0.968    |

The result in Table 8 shows the mean retention ability scores, self-efficacy, reasoning ability and emotional intelligence of students as 65.1250, 65.1, 65.2 and 65.0875 respectively with an r value of 0.96. This is an indication that students with positive self-efficacy, reasoning ability and emotional intelligence may likely to also have high scores in terms of performance in trigonometry (positive correlation). But, we cannot conclude about its significance until its corresponding null hypothesis ( $H_{03}$ ) is tested.

**Null Hypothesis Three ( $H_{03}$ ):** There is no significant relationship among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of female students in trigonometry. To test this null hypothesis three ( $H_{03}$ ), an inferential statistic of Multiple Correlation Analysis was used as presented in Table 9

**Table 9: Summary of Multiple Correlation Analysis on Self-Efficacy, Reasoning Ability, Emotional Intelligence and Retention Ability Scores of Female Students in Trigonometry**

| Var. | R.S   | S.E   | R.A   | E.I   | Mean   | Std.D   | $\alpha$ . | P value | Decision    |
|------|-------|-------|-------|-------|--------|---------|------------|---------|-------------|
| R.S  | 1.000 |       |       |       | 65.125 | 2.95697 | 0.05       | 0.000   | Significant |
| S.E  | 0.968 | 1.000 |       |       | 65.100 | 2.91482 | 0.05       | 0.000   | Significant |
| R.A  | 0.956 | 0.979 | 1.000 |       | 65.200 | 2.82126 | 0.05       | 0.000   | Significant |
| E.I  | 0.968 | 0.968 | 0.967 | 1.000 | 65.088 | 2.94762 | 0.05       | 0.000   | Significant |

Significant at  $p \leq 0.05$ .

The result in Table 9 shows all the observed P values (0.000) at  $\alpha = 0.05$  with degree of freedom (df = 93) and a very small average mean difference of 0.09 were significant. Therefore, the null hypothesis of no significant relationship among emotional-intelligence, reasoning-ability, self-efficacy and retention ability scores of female students in trigonometry is rejected. Hence, there is significant relationship among emotional intelligence, reasoning ability, self efficacy and retention ability scores of female students in trigonometry. However, according to Cohen (1988) and Musa (2016), the direction is positive and the effect size of this significant relationship that exist is strongly or very high correlation (0.963) such that for any increase or decrease in terms of emotional-intelligence, reasoning ability and self-efficacy of female students in trigonometry will lead to also an increase or decrease in terms of retention ability scores of female students in trigonometry by 96%.

## Discussions of Results

Based on the findings of this study, the discussions were as follows:

Finding of this study showed that, there exists a very high positive correlation (0.97) among emotional intelligence, reasoning ability, self efficacy and retention ability scores of both male and female students in trigonometry. This finding confirmed the studies of Fayombo (2012) and Oyenuga and Lopez (2012) earlier found that, there existed a very high positive correlation between emotional intelligence and retention ability scores of both male and female students. However, studies carried out by Bhat (2016) and Doris (2018) earlier also found that, there existed a very high positive correlation between reasoning ability and retention ability scores of both male and female students. Similarly, Tenau (2013) and Mustafa, Amal and Enas (2015) also found that, there exists a very high positive correlation between self efficacy and retention ability scores of both male and female students in science and science related courses.

Finding of this study showed that, there exists a very high positive correlation (0.98) among emotional intelligence, reasoning ability, self-efficacy and retention ability scores of male students in trigonometry. This finding confirmed the studies of Oyenuga and Lopez (2012), Fayombo (2012) and Rice (2014) earlier found that, there exists a very high positive correlation between emotional intelligence and retention ability scores of male students. However, studies carried out by Mari (2012), Bhat (2016) and Doris (2018) earlier also found that, there existed a very high positive correlation between reasoning ability and retention ability scores of male students. Similarly, Tenau (2013), Safaria (2013), Mustafa, Amal and Enas (2015), also found that, there existed a very high positive correlation between self efficacy and retention ability scores of male students in science and science related courses.

Finding of this study showed that, there exists a very high positive correlation (0.96) among emotional-intelligence, reasoning-ability, self-efficacy and retention ability scores of female students in trigonometry. This finding confirmed the studies of Fayombo (2012) Oyenuga and Lopez (2012) and Rice (2014) earlier found that, there existed a very high positive correlation between emotional intelligence and retention ability scores of female students. However, studies carried out by Lillian (2010), Oleyede (2012), Mari (2012), Bhat (2016) and Doris (2018) earlier also found that, there existed a very high positive correlation between reasoning-ability and retention ability scores of female students. Similarly, Safaria (2013), Tenau (2013) and Mustafa, Amal and Enas (2015) also found that, there existed a very high positive correlation between self efficacy and retention ability scores of female students in science and science related courses.

## Conclusions

Based on the interpretation of the findings, the following conclusions were drawn:

Finding of this study showed that, there existed a very high positive correlation (0.97) among emotional-intelligence, reasoning-ability, self-efficacy and retention ability scores of both male and female students in trigonometry which means that, for any increase or decrease in terms of emotional-intelligence, reasoning-ability and self-efficacy of both male and female students in trigonometry serve as predictors in terms of retention ability scores of both male and female students in trigonometry by 97%.

Finding of this study showed that, there existed a very high positive correlation (0.98) among emotional-intelligence, reasoning-ability, self-efficacy and retention ability scores of male students in trigonometry which means that, for any increase or decrease in terms of emotional-intelligence, reasoning-ability and self-efficacy of male students in trigonometry serve as predictors in terms of retention ability scores of male students in trigonometry by 98%.

Finding of this study showed that, there exists a very high positive correlation (0.96) among emotional-intelligence, reasoning-ability, self-efficacy and retention ability scores of female students in trigonometry which means that, for any increase or decrease in terms of emotional-intelligence, reasoning-ability and self-efficacy of female students in trigonometry serve as predictors in terms of retention ability scores of female students in trigonometry by 96%.

Hence, emotional-intelligence, reasoning ability and self-efficacy are good predictors of retention ability of students in trigonometry among senior secondary schools in Katsina State, Nigeria.

## **Recommendations**

Based on the findings of this study, the following recommendations are made:

The study established that, emotional intelligence, reasoning ability and self efficacy are effective means or factor to be used in predicting or determining the retention ability of both male and female students in trigonometry. Therefore, mathematics teachers should be able to consider them in teaching and learning of trigonometry and they should be used when predicting the retention ability of students.

Textbook publishers should publish textbooks that contain the guidelines and procedures for the use of emotional intelligence, reasoning ability and self efficacy as predictors of retention ability of male and female students in trigonometry.

Curriculum developers Educational Administrators and commissioners as well as Educational planers should emphasize the used of emotional intelligence, reasoning ability and self efficacy as predictors of retention ability of male and female students in trigonometry in particular and mathematics in general.

Ministry of Education in collaboration with professional bodies such as Mathematics Association of Nigeria (MAN), Science Teachers Association of Nigeria (STAN) and National Teachers Institute (NTI) should organize Seminars, Workshops and Conferences aim at teaching senior secondary school teachers on how to use emotional intelligence, reasoning ability and self efficacy of students as predictor of retention ability of students in teaching and learning of trigonometry in particular and mathematics in general.

Parent teachers Association and Non-Governmental Organization should be able to provide instructional materials that will enable mathematics teachers to predict retention ability of students using emotional intelligence, reasoning ability and self efficacy as predictors or determinants of student's retention ability.

## References

- Adolphus, T. (2011). Problems of Teaching and Learning of Geometry in Secondary Schools in River State, Nigeria. *International Journal of Science Educational* 1(2), 143-152.
- Bhat, M.A. (2016). Construction and Evaluation of Reasoning Ability Test. *Journal of Educational Studies*, 1(2), 47-52.
- Cohen, D., Raudenbush, S. & Ball, D. (2003). Resources, instruction and research. *Educational Evaluation and Policy Analysis*, 25(2), 1-24.
- Doris, M. (2018). Effect of Reasoning Ability on Academic Performance of students in Ezeagu Local Government Area of Enugu State, Nigeria. *Journal of Education*. 1(3), 237-246.
- Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*. Philadelphia, PA: Psychology Press
- Fayombo, C. (2012). "Emotional Intelligence Inventory for Adolescents" *International Journal of Educational Studies*, 14(5). (Online). <http://WWW.Learning-Journal.Com>.
- Katsina State Ministry of Education (M.O.E.), Katsina. *Analysis of SSCE Results, WASSCE 2012-2018*.
- Lavins, B. (2011). Emotion's Effect on Reasoning with Quantifiers.
- Lillian, B. (2010). Effect of Reasoning Ability on Academic Performance of students. *Journal of Educational Research* 87(5), 541-546
- Mari, J.S. (2012). Gender related differences in acquisition of formal reasoning schemata. *International Journal for Cross-Disciplinary Subjects in Education. (IJCDSE)*, 2(2), of 2012.
- Musa, M. (2016). A Key Note Address Presented at 2016 Post Graduate Students' Conference Held at Ahmadu Bello University School of Post Graduate Studies Auditorium 23<sup>rd</sup> To 24<sup>th</sup> November, 2016.
- Mustafa, A. Amal, & S. Enas, M. (2016). Emotional Intelligence, Self-Efficacy and Academic Performance among Students. *PMC Published Article, Ahmad Dahlan University*
- Nezami, E. Schwarzer, R. & Jerusalem, M. (2005). [Internet] Tehran: Health psychology department;. Dec, [cited 1997 Dec 26]. Available from: [fub Berlin. de/~health/persean.htm](http://fub Berlin.de/~health/persean.htm). Persian . [Google Scholar]
- Oyenuga, A.O. & Lopez, Z.O. (2012). Psycho-Social Factors Affecting the Teaching and Learning of Introductory Technology in Junior Secondary Schools. *Journal of Psychology*, 3(2), 113-120.
- Research Advisor (2006). Table for Determination of Sample Size.

- Safaria, T. (2013). Effects of self-efficacy on Students Academic Performance. *Journal of Educational Health and Community Psychology (JEHCP)*, Ahmad Dahlan University
- Tenau, Y.A. (2013). The Relationship Between Self-Efficacy and Academic Achievement Among Analytical Chemistry Students at Debra Markos College of Teacher Education. *African Journal of Educational Studies*.3(1), 3-28.
- Udoh, C. (2011). Overcoming candidates poor performance at the West African Senior Secondary Certificate: *A paper presented by Stella, E.* Retrieved May 14, 2011 from [www.leadershipeditors.com/indexPh](http://www.leadershipeditors.com/indexPh).
- West African Senior Secondary Certificate Examination, WASSCE (2018). Research and Statistics Department, Katsina State Ministry of Education (M.O.E.), Katsina. *Analysis of SSCE Results, WASSCE 2012-2018*.