JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

Correlational Analysis Between Self – Regulated Learning Strategy and Academic Performance of Students of Kaduna State College of Education, Gidan Waya, Nigeria

[1]Jonah Ayuba Anzah, [2]Lem Godfrey Daniel, [3]Muhammad Umar Sumaila
[1&2]Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya
[3]Kano State College Of Education And Preliminary Studies

ABSTRACT
The study investigated the Relationship between Self – Regulated Learning Strategy and Academic Performance of 100 level NCE Science Students in Kaduna State College of Education, Gidan Waya, Nigeria. The study adopted Quasi experimental design of pre – test/post –test control group. The population of the study consisted of (1,179) students comprising of six hundred and seventy-three (673) males and five hundred and six (506) females. A Sample of (120) students consisting of (60) each for male and female were selected using the Purposive and Stratified Sampling techniques. The experimental and control groups each has 60 students (30 males and 30 females). The Experimental Group were taught topics drawn from NCE I contents of Basic General Mathematics using Self – Regulated Learning Strategy while the Control Group were taught the same contents using the Lecture method within a treatment period of six weeks. Self – Regulated Learning Strategy Questionnaire (SRLQ) with a reliability co-efficient of 0.94, and the Basic General Mathematics Performance Test (BGMPT) with reliability coefficient of 0.61 were used as data collection instruments. The data collected were analyzed using Descriptive Statistics, Pearson Product Moment Correlation Coefficient, and the t- test at a significant level of $p < 0.05$. The finding revealed a slight relationship ($r=0.486$) between SRLS and Academic Performance of Science students in Mathematics. The study concluded that teachers of Mathematics can help their students to self – regulate in their learning, thereby improving their Academic Performance in Mathematics generally. Recommendations were made base on the findings of the study.

ARTICLE INFO
Article History
Received: May, 2026
Received in revised form: June, 2026
Accepted: August, 2026
Published online: September, 2026

KEYWORDS
Self – Regulation, Academic Performance, Basic General Mathematics, Cognitive Strategy

INTRODUCTION

Teaching and learning of Mathematics involves a cognitive interaction between the teacher and learner. (Schoenfeld, 2009) states that this interaction provides learners with a sense of the discipline, scope, power, uses, and history of Mathematics. It gives them a sense of what Mathematics is and how it is done, at a level appropriate for them to experience and understand. As a result of their instructional experience, students learn to value Mathematics and feel confident in their ability to do Mathematics.

Academic performance of science students at the NCE level is fundamental to the human resource development and provision of qualified Science teachers at the primary and junior secondary schools' level of our educational system. Hence Mathematics educators must adopt proven instructional strategies in their impartation of Mathematical knowledge (Miciano, 2005).

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

Cognitive Strategies

Cognitive Strategy Instruction is based on the assumptions that there are identifiable cognitive strategies, previously believed to be utilized by only the best and the brightest students which can be taught to most students. The use of these strategies has been associated with successful learning (Borkowski, Carr, & Pressley, 1997). According to (Read, 2005), Cognitive Strategy Instruction is effective for a variety of learners, but particularly students with learning disabilities. However, research has shown that normal students who are actively involved in the education process, have better retention, motivation, and overall attitude towards learning. BEESS (2010) gave the following as examples of Cognitive Strategies; SQR (Survey, Question, Read), Frayer Model (Concept Mapping), Mnemonic Device, Graphic Organizers, Self – Regulated Learning (SRL), Cooperative Learning, Thinking Aloud, Problem Solving, and Modeling.

Self – Regulated Learning Strategy (SRL) or Monitoring and Control

Self –Regulated Learning or Monitoring and Control is one of the broad arenas of Cognitive Strategy in Metacognition (Schoenfeld, 2009). It deals with resource allocation during cognitive activity, and or problem solving. Zimmerman (2001) defines Self – Regulatory Learning as "Learning that occurs largely from the influence of students' self-generated thoughts, feelings, strategies, and behaviours, which are systematically oriented towards the attainment of goals".

Self – Regulated Learning (SRL) is recognized as an important predictor of student academic motivation and achievement. This process requires students to independently plan, monitor, and assess their learning. (Anyichie and Onyedike, 2012) conducted research to determine the effect of Self – Instructional learning strategy on secondary school students' academic achievement in solving mathematical word problems in Nigeria. The study utilized the non – randomized control group pre – test post – test experimental design, while the sample consisted of 131 students randomly selected from four schools.

Students of the experimental group were instructed in four units of Mathematics syllabus using Self – Instructional method and on the other hand, the control group was taught the same topics in Mathematics syllabus using the conventional teaching method. Mathematics Achievement test instrument was used to collect data which was analyzed using the two – way ANCOVA at $p \leq 0.05$ level of significance. Major findings of the study indicated there was significant main effect of the treatment (SRL) on the students' Mathematical word problem achievement, and it also concluded that there is a significant interactional effect between gender and learning strategy of students trained in Self – Instructional strategy as male subjects achieved higher than females.

Models/Phases of SRL

From the available literature consulted, four major models of SRL were identified namely Zimmerman (2009), Pintrich (2004), Winne & Hadwin (1998), and Boekaerts (1996) models. These models describe SRL as a continuum of three to four learning phases that lead to students' SRL by building on the previous phase. It is assumed that these phases can occur multiple times during a single learning situation or across several learning episodes, but they do not necessarily unfold in order. The Zimmerman SRL model was chosen specifically for this research and subjects were trained in the use and application of the model.

Zimmerman Model of SRL.

This model consists of the following:

***Forethought/Pre-action**:*

This phase precedes the actual performance, sets the stage for action, maps out tasks to minimize the unknown, and helps to develop a positive mindset. Realistic expectations can make the task more appealing. Goals must be set as specific outcomes, arranged in order from short to long term. Here, learners consider the following questions; when will I start? Where will I

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

do the work? How will I get there? And What conditions will help or hinder my learning activities are part of this phase.

Performance control:

This phase involves processes during learning and the active attempt to utilize specific strategies to help a student/learner become more successful. The following questions becomes relevant at this phase;

1. Are the learners accomplishing what they hoped to do?
2. Are they being distracted?
3. Is the task taking more time than they thought?
4. Under what conditions do they accomplish the most?
5. What questions can they ask themselves while they are working?
6. How can they encouraged themselves to keep working?

Self – reflection:

This level involves reflection after the performance, a self – evaluation of outcomes compared to the goals set. The following questions should be addressed;

1. Did the learners accomplish what they planned to do?
2. Where they distracted and how did they get back to work?
3. Did they plan enough time or did they need more time than they thought?
4. Under what conditions do they accomplish the most work?

STATEMENT OF PROBLEM

The Performance of Integrated Science students in Mathematics was assessed based on the grades obtained by the students and it was discovered that a high percentage of these Integrated Science students end up with average and lower grades of C, D, E, and F. The interest of the researchers was kindled by (Bergstresser, 2005) in her work "Metacognition and its Effect on Learning High School Calculus" in which twenty-seven students (12 males and 15 females) were involved and it was the first time any of the students had taken a Calculus course. A pre and post – tests were administered to the subjects and the result obtained showed a highly significant performance in High School Calculus (See table 1). Thus, the researchers felt moved to investigate further the effect of Self – Regulated Learning Strategy (SRL) on the Mathematics Academic Performance of NCE I Science students.

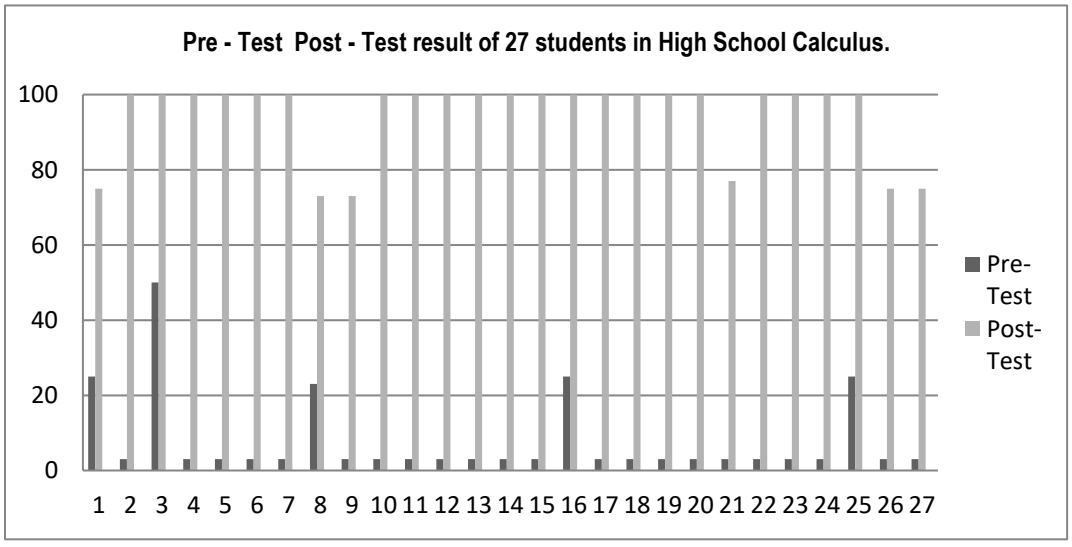

Figure 1: Bar chart showing pre – test post – test result of 27 students in High School Calculus.

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

Objectives of the Study

The main objective of this research was to investigate the effect of Self – Regulated Learning Strategy on Academic Performance in Basic General Mathematics among NCE I Science students of Kaduna state College of Education. Specifically, the study sought to:

1. Examine the relationship between Self – Regulated Learning (SRL) Strategy and the Academic Performance in Basic General Mathematics of NCE I Science students.
2. Determine if SRL Strategy results in any differences in the mean score of male and female NCE I Science Students' Academic Performance in Basic General Mathematics.

Research Questions

The following research questions were formulated to help the researcher in achieving the objectives stated above.

1. To what extent does SRL Strategy relate to Mathematics Academic Performance of NCE I Science students in Basic General Mathematics?
2. Does SRL Strategy influence gender Academic Performance in Basic General Mathematics among NCE I Science Students?

Null Hypotheses

The following null hypotheses were formulated for the purpose of this research and tested at $p < 0.05$ level of significance

H_{o1} : There is no significant relationship between SRL and Academic Performance of NCE I Science students taught using SRL Strategy and those taught using the Lecture method.

H_{o2} : There is no significant gender difference in the mean score of Academic Performance of NCE I Science students taught Basic General Mathematics using SRL Strategy and those taught using the Lecture method.

Scope of the Study

The research was delimited to NCE I Science students of Kaduna State College of Education, Gidan Waya, the Basic General Mathematics contents and the data collection instruments and the procedure for data analysis.

Significance of the Study

This research identified SRL as one way to improve teaching and learning of Mathematics for better Academic Performance in Mathematics among Science students in particular and the study of Mathematics generally. This study was conducted in Kaduna State College of Education, Gidan Waya and the findings will provide Mathematics instructors the evidence on what the implication of SRL Strategy on learning Mathematics. The findings as well will provide beneficial and convincing information to Colleges of Education and Institutions of higher learning to include SRL Strategy in the preparation of course and study material in Mathematics. Other benefits from the research include the followings:

Mathematics Teachers:

SRL learning strategy will lead to developing effective Mathematics teachers who will be responsive to the diverse academic needs of learners. SRL will improve their quality of instructions, which in turn will result in better academic performance in learners.

Students/Learners:

The findings of this study will expose learners and students to become active users of SRL Strategy, and will equip them to plan (Fore – thought), control (Performance), and reflect (Self – reflective) in their own learning process (Zimmerman, 2010) which transform them into better Academic Performers in Mathematics.

Curriculum Planners:

Self – Regulated Learning strategy can be used by Curriculum planners for capacity building in Mathematics curriculum to enhance reform in schools and institution of higher learning.

Professional Bodies/Organizations:

This research will provide helpful information to associations, research institutes and organizations such as MAN, STAN, NERDC,

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

NTI, to include SRL strategy in Mathematics teaching innovation. Theoretically, the findings of this study will have a strong implication for Mathematics instruction in order to promote Self – Regulation among learners. It is desired that this work will add to existing literature and shall serve as a landmark for further research on the effect of SRL Strategy on Mathematics Self – Concept and Academic Performance of students.

Educational Publishers:

Teachers guide in teaching Mathematics especially at the Secondary schools and Colleges of Education can be improved by publishers to include the findings of this research in order to enhance new innovation. Also, textbooks on Mathematics can be improved based on SRL strategy.

Researchers:

Researchers may find the new information in this dissertation which can be added to existing literatures to encourage further research on the Self – Regulated Learning Strategy in the teaching/learning process.

METHODOLOGY

The researchers adopted Correlational research design to find out if there is any relationship between SRL capacity and Academic performance of NCE I Science students in Basic General Mathematics. The population of the study is 1,179 students from 22 Science combinations in the 2018/2019 academic session made up of 673 males and 506 females. A sample of 60 males and 60 females were randomly selected for the study using the Purposive and Stratified sampling technique (Gupta, 2013 & Tuckman, 1975). Two instruments were used for data collection and these are the Self – Regulated Learner Questionnaire (SRLQ) developed by Callan (2014) which was adopted and is on a 5 – point Likert scale. It has a reliability Coefficient α = 0.94. The questionnaire requires that subject rate SRL Strategy used in an academic setting and assessed how they often apply or implement certain SRL Strategies when they study Basic General Mathematics for tests, examinations, homework, or assignments and how they also apply SRL techniques during written tests, assessment, or examinations. The reliability Coefficient of SRLQ is α = 0.94 (Callan, 2014).

The second instrument is the Basic General Mathematics Performance Test (BGMPT) which was sourced and compiled by the researchers from standardized semester examinations test items and it measured learners' level of Academic Performance in Basic General Mathematics. It consists of objective test items (Multiple choice, True/False, and Fill in the blank spaces) which is in line with the National Commission for Colleges of Education (NCCE, 2012) Minimum standard.

The BGMPT covered some topics extracted from the syllabus for the Basic General Mathematics course and was validated by experts in the Department of Science Education, Ahmadu Bello University, Zaria and its reliability index was calculated using the split – half reliability test which gave a Cronbach alpha value of α = 0.61. Data analysis was done using the Pearson product moment Correlation coefficient to test for degree of relationship between SRL and BGMPT of subjects while the *t – test* was used to test for mean difference in the BGMPT result for male and females.

RESULTS

The results of the analysis were presented in Table 2

Research Question One:

To what extent does SRL Strategy relate to Mathematics Academic Performance of 100 level Science students in Basic General Mathematics?

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

Table 2: Descriptive Statistics Summary for Pre – test Post – test of SRL Capacity and BGMPT

Group	Pre-test				Post-test			
	N	Mean	Std. Deviation	S.E	N	Mean	Std. Deviation	S.E
SRL	60	112.23	10.97	2.00	60	123.71	16.19	1.48
BGMPT	60	58.70	8.17	1.49	60	65.24	12.82	1.17

Source: *Statistical Package for Social Science (SPSS 26)*

Table 2 clearly shows an improvement of SRL capacity in the subjects with a mean difference of 11.48 in favour of post-test while a difference can also be observed in their academic performance in BGMPT where the mean difference is 6.54 in favour of post-test. Thus, SRL may relate to Academic Performance, however, the null hypothesis will be tested by applying the Pearson Product Moment Correlation Coefficient to determine the degree of relationship between SRL and Academic performance of science students.

Null hypothesis One:
There is no significant relationship between SRL and Academic Performance of 100 level Science students taught using SRL Strategy and those taught using the Lecture method.

Table 3: Pearson Product Moment Correlation Coefficient of Post – Test SRL capacity and BGMPT Score

Source	N	Mean	Std. D.	*r*
SRL	60	123.71	16.19	0.486
BGMPT	60	65.24	12.82	

Source: *Statistical Package for Social Science (SPSS version 26)*

Table 3 presented the results of the Pearson Product Moment Correlation analysis and the coefficient of correlation *r = 0.486* was obtained. The result shows a positive but not strong correlation between SRL capacity in the subject and their corresponding score in Basic General Mathematics. Thus, it can be concluded that there is a slight positive but weak correlation between the SRL capacity of science students and their academic performance in Basic General Mathematics course. This result is in complete agreement with Olaoye (2012), Anyichie and Onyedike (2012), Bozpolat (2016), and Zimmerman (1990).

Research Question Two:
Does SRL Strategy influence gender Academic Performance in Basic General Mathematics among 100 level Science Students?

Table 4: Descriptive Statistics summary of Post – Test SRL and BGMPT showing Gender Performance in the Experimental Group.

	SRL Capacity					BGMPT			
Source	N	Mean	Std. D.	S.E	M.Diff.	Mean	Std. D.	S.E	M.Diff.
Male	30	123.50	17.38	2.24		64.30	14.38	1.86	
Female	30	123.92	15.06	1.94		66.18	11.12	1.44	

Source: *Statistical Package for Social Science (SPSS 26)*

Table 4 shows the summary of Post – Test SRL and BGMPT showing gender

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(3), SEPTEMBER, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

performance in the Experimental Group. From Table 3, there is virtually no difference in the SRL capacity for both males and females as mean difference is 0.42 while the BGMPT mean for males is 64.30(14.38) which is less the mean of the females 66.18(11.12) with a mean difference of 1.88. This indicates that SRL Strategy influences better Academic Performance in female than in male students of NCE I Science students. However, this influence may not be of significant effect until a *t –test* analysis is done on hypothesis two.

Hypothesis Two:
There is no significant gender difference in the mean score of Academic Performance of NCE I Science students taught Basic General Mathematics using SRL Strategy and those taught using the Lecture method.

Table 5: Summary of *t – test* on BGMPT Average Score of Male and Female Students

Source (EG)	N	Mean	Std. Dev	df	t-value	p-value	Decision
Male	30	64.30	14.38				
				29	-1.107	.273	Retain Ho2
Female	30	66.18	11.12				

Significance level at 0.05 ***Source:*** *Statistical Package for Social Science (SPSS 26)*

Table 5 presented the Summary of *t – test* on BGMPT average score of male and female students taught using SRL. From Table 4 reveals that *p – value* is 0.273 and is greater than alpha – value = 0.05. Thus, hypothesis two is retained which means that there is no significant difference in gender mean score of NCE I Science students in BGMPT.

CONCLUSION

This research concluded that Students taught BGM through SRL strategy attain a higher and better level of Academic Performance than those taught through the Lecture method and they also exhibited certain Cognitive skill associated with SRL such as Problem-Solving capacity. Again, Male and female students in the treatment group fared slightly different in their Mathematics Performance with virtually equal SRL capacity. However, female students have an edge over their male counterparts in the BGMPT score.

RECOMMENDATIONS

The following recommendations are made from the findings and conclusion of the study. Teachers of Mathematics could use SRL training guide/manual to enhance and improve their instructional skills which encourage students' participation and engagement in becoming Self – Regulated in their learning of Mathematics. Also, Findings can be used to develop/design course/workshop manuals and or books for the purpose of teaching SRL skills to students for higher performance in Mathematics.

REFERENCES

Anyechie, A.C. & Onyedike, C.C. (2012). Self – Instructional Learning Strategy on secondary school students' academic achievement in Solving Mathematical word problems in Nigeria. *African Research review, An international Multidisciplinary journal, Ethiopia, 6(4), pg 302 – 323.*

Bandura, A. (1989). Human Agency in Social Cognitive Theory. American Psychologist, 44, 1175-1184.

BEESS (2010). Classroom Cognitive and Meta – Cognitive Strategies for Teachers. Bureau of Exceptional Education and Student Services. Research Based Strategies for Problem Solving in Mathematics.

Bergstresser, B. S. (2005). Metacognition and Its Effect on Learning High School Calculus. An unpublished Ph.D Thesis submitted to the Graduate Faculty of Louisiana State University and B. S. Georgia Institute of Technology, USA.

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.

Boekaerts, M. (1996). Self-Regulated Learning at the Junction of Cognition and Motivation. *Journal of European Psychologist, 1(2), pp 100 – 112. Hogrefe & Huber Publishers.*

Borkowski, J, Carr, M, and Pressley, J. (1997). Spontaneous Strategy Use: Perspective from Metacognitive Theory of Intelligence*: Journal of psychology, 11 pg 61 – 75*

Bozpolat, E. (2016). Investigation of the Self – Regulated Learning Strategies of students from the Faculty of Education Using Ordinal Logistic Regression Analysis. *Educational Science: theory and Practice, 16(1), pg 301 – 318.*

Callan, G.A. (2014). Self – Regulated Learning: Microanalysis for Mathematical Problem Solving: A Comparison of SRL Event Measure, Questionnaires, and Teacher Rating Scale. An unpublished Ph.D Dissertation on Educational Psychology, University of Winconsin- Milwaukee, USA.

Dole, J. A., Nokes, J. D., & Drits, D. (2009). *Cognitive Strategy Instruction*; Handbook of Research on reading Comprehension. Mahwah, NJ; Erlbaum.

Mace, F.C., Belfiore, P.I., & Shea, M.C. (1989). Operant Theory and Research on Self – Regulation. In B.J. Zimmerman, and D.H. Schunk (Eds), Self –Regulated Learning and Academic Achievement: Theory, Research, and Practice. New York: Springer – Verlag. Pg 27 – 50.

Miciano, T. A. (2005). *Fundamental Principles on Teaching Mathematics*? New York: # McGraw-Hill Book

NCCE (2012). *Nigeria Certificate in Education Minimum Standard for Sciences*. 12th Edition. Abuja. NCCE Press.

NCTM, (2000). Principles and Standarts for School Mathematics. National Council of Teachers of Mathematics, Reston, VA.

Pintrich, P.R. (2004). A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students. *Educational Psychology review, 16(4), pg 385 – 407.*

Scheid, K. (2000). *Helping Students Become Strategic Learners: Guidelines for teaching*. Cambridge, MA: Brookline Books.

Schoenfeld, A. H. (2009). *Learning To Think Mathematically: Problem Solving, and Sense – Making in Mathematics*. A Handbook for esearch on Mathematics Teaching and Learning,New York: Macmillan.

Tuckman, B.W. (1975). *Measuring Educational Outcomes*. New York, Harcourt Brace

Haugwick. VanDijk, T. A and Kintsch, W. (1993). *Strategies for Discourse Comprehension*. Orlando FL; Academy Press.

Veenman, M. V. J, VanHout – Wolters, B. H, and Afterbach, P. (2006). Metacognition and learning Conceptual and Methodological Considerations. *Electronic journal of Research in Educational Psychology, 13, I5(3), pg 3- 14.*

Winne, P.H. & Hadwin, A.F. (1998). *Studying as Self-Regulated Learning*. In D.J. Hacker, J.Dunlosky, & A.C.Graesser (Eds), *Metacognition in Educational Theory and Practice. Pp277 – 304, Hillside, NJ: Erlbaum.*

Wolters, C.A., Pintrich, P.R., & Karabenic, S.A. (2003). Assessing Academic Self-regulated Learning. Being a paper presented at the conference on Indicators of Positive Development: *Definitions, Measures, and Prospective Validity; Michigan National Institute of Health.*

Zimmerman, B. J. (2001). Theories of Self – Regulated Learning and Academic Achievement: an overview and analysis. In B. Zimmerman & D. Schunk (Eds.), Self-regulated learning and academic achievement: theoretical perspectives (2nd ed., pp. 1–37). Mahwah, NJ: Erlbaum.

Zimmerman, B. J., & Moylan, A. R. (2009). Self – Regulation: Where Metacognition a Motivation intersect. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), Handbook of Metacognition in Education New York: Routledge. pg. 299-316.

Zimmerman, B.J. (1990). Self – Regulated learning and Acadenic achievement: *An Overview. Journal, Educational Psychologist, 25(1), pg 3 – 17.*

Corresponding author: Jonah Ayuba Anzah
anzahjonah@gmail.com
Department of Science Education, School of General Studies Education, Kaduna State College of Education, Gidan Waya.