

Academic Self-Efficacy, Reinforcement, Motivation and Metacognition of Senior Secondary School Students in Delta State

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Abstract

The study examined the academic self-efficacy, reinforcement, motivation, and metacognition of senior secondary school students in Delta State of Nigeria. Three research questions guided the study. The study adopted a correlational research design with a population of 82,243 students in 477 public senior secondary schools (S.S.1&2) in the three senatorial districts of Delta State. A sample size of 540 senior secondary school students was selected through a multi-stage sampling procedure. A self-modified questionnaire titled “Academic Self-efficacy, Reinforcement, Motivation and Meta-cognition of Senior Secondary School Students in Delta State” (ASRSMMSSSDS) was used in collecting data from the respondents. A reliability coefficient index of 8.22 was obtained using Cronbach's Alpha method while statistical mean was used in analyzing the data. The findings of the study revealed that there is a significant relationship between academic self-efficacy and student metacognition; there is a positive significant relationship between reinforcement and student metacognition and finally, there is a significant relationship between motivation and student metacognition in public senior secondary schools in Delta State. The study recommended that metacognitive training should be integrated into the educational curriculum of secondary schools in Delta State to enhance students’ self-awareness, self-regulation, and self-evaluation skills. Also, Delta State Educational Commission should provide career development opportunities for teachers to enhance their knowledge of metacognition, self-efficacy, reinforcement, and motivation to promote students’ metacognitive and academic self-efficacy skills. Finally, self-reflection and self-evaluation opportunities should be provided for students to regularly reflect on their learning, set goals, and evaluate their academic progress.

KEYWORDS: Academic Self-Efficacy, Reinforcement, Motivation, Metacognition, and Senior Secondary School Students.

Introduction

It is a recognized fact that students go to school to acquire indispensable information and skills that will be useful to them and humanity at large. Acquisition of knowledge, therefore, takes place when it encompasses appropriate communication between the teacher and the students. Individually, learning commences right from the minute an individual first interacts with the external world, and what assists him in contributing in the interactional setting is the skill of cognitive awareness (Özçakmak, Köroğlu, Korkmaz, & Bolat, 2021). To Flavell (1979), metacognitive awareness is cognition about cognition. Cognition according to Onan (2013), refers to the methods by which an organism to get information about its immediate environment and to employ this information in comprehending and solving world problems. Sugiyama, Schweighofer, and Izawa, (2023) observed that metacognition is essential for controlling learning speeds and memory retention. For proper and effective interaction to occur, the students must be able to think about their learning strategies and contribute their thoughts to the teaching-learning exercise. Metacognitive awareness is a major contributor to learning success and signifies an outstanding instrument for the measurement of academic performance (Abdelrahman, 2020). Improved learning motivation is often the result of successful meta-cognitive development. Students with metacognitive skills may manage learning and its application by controlling their thoughts, assessing and analyzing the amount of time needed for study, and adopting the proper approach (Anthonysamy, 2021).

There is a growing body of research on the development of meta-cognitive skills in students, as these skills are crucial for academic success and lifelong learning. Meta-cognitive development begins in early childhood and continues throughout the lifespan. Harvard Business Review article revealed that the principal concern in learning is that students are not involved in meta-cognition enough (Boser, 2018) and they show narrow use of metacognitive strategies in their learning (Anthonysamy, Koo & Hew, 2020). Meta-cognitive strategies regulate the use of

cognitive strategies and to a great degree, the disappointment or achievement of learning depends on the disappointment or achievement of the use of meta-cognitive strategies (O'Malley & Chamot, 1990). This limitation in the use of meta-cognitive strategies has added to low learning performance among students (Hu & Li, 2017). The findings of Guner and Erbay (2021) revealed that students with poor metacognitive skills have challenges in comprehending the problem, selecting suitable strategies, and finding accurate answers. Mussa (2019) disclosed that the factors influencing students' metacognition ability to academic performance are the quality of teachers, instructional methods and materials, in-service teachers' training programmes, guidance and counselling, and parent cooperation.

Effects of low metacognition among students have led to increased examination malpractice and low thinking faculty of the students. This has made them entirely dependent on the classroom teachers for solutions to academic exercises and the use of artificial intelligence without brainstorming on their own. For instance, in the 2014 May/June West African Senior School Certificate Examinations (WASSCE) result only 31.2% i.e. (529,425,000 out of 1,692,435,000 candidates) have credit pass in 5 subjects including English and Mathematics as against 36.57% in 2013, and 38.81% in 2012. The below 50% performance in the last 7 years indicated that the Nigerian secondary education system requires an urgent, full-scale diagnosis which deserves physicians (BusinessDay, 2014). In the 2015 WAEC examination, one million five hundred and ninety thousand, two hundred and eighty-four candidates sat for the examination, in which only 562,413 candidates obtained credit in five subjects and above including English language and mathematics. In other words, 1,029,871 representing 64.63% failed to obtain admission requirements to the national universities. Further breakdown shows Delta State at the eighth position in the list of top performance charts (Punch Newspaper, 2016).

National Bureau of Statistics (NBS) in September 2019 reported the WASSCE results of public secondary school students' performances between 2016

and 2018. In their report, a total number of 51,216 public secondary school students in Delta State sat for the examination in 2016 with a percentage performance of 62.3% in 5 credits and above including English and Mathematics. In 2017, a total number of 49,445 public students sat for the examination with 64.86% performance in 5 credits and above including English and Mathematics. In 2018, 53,546 students sat for the examination with 51.83% performance in credits and above including English and Mathematics. In 2019 the statistics showed that 30,825 students sat for the examination out of which 14,890 were males while 15,935 were females. A total of 19,371 students of which 9195 were males and 10,176 females representing 62.84% obtained 5 credits and above including English and Mathematics. In 2020, 31,384 students sat for the examination of which 14,948 were males while 16,436 were females. A total number of 20,379 comprising 9,373 male and 11,006 female candidates representing 64.93% obtained 5 credits and above including English and mathematics. In 2021, 34,790 students sat for the examination of which 16,226 were males and 18,564 were females. A total number of 30,496 comprising 14,199 male and 16,297 female candidates representing 87.65% obtained 5 credits and above including English and Mathematics.

In an attempt to stimulate and enhance learning in the state, Delta State Government in 2021 requested for five-year results of all public senior secondary schools in the state from the WAEC and the National Examination Council (NECO) and others to evaluate the performance of her students in the examinations. This was delivered by the State Commissioner for Basic and Secondary Education, Patrick Ukha in Asaba, Kwale, and Agbor respectively during interactive meetings with members of the All-Nigeria Conference of Principals of Secondary Schools (ANCOPSS) drawn from various local government areas of the state (BusinessDay, 2021). Despite these efforts, the News Agency of Nigeria (NAN) reports that the 2022 WASSCE result showed that Nigerian students performed 5% worse than 81.7% of what they did in 2021 nationwide.

Hence, only when learners have developed metacognitive awareness, that they are able to control their learning process consciously, conducting self-reflection and self-evaluation (Xu, 2012). Overall, the development of meta-cognitive skills is an important aspect of student learning and academic success. Providing students with opportunities to engage in self-regulated learning and teaching them strategies for learning can support the development of these skills.

Conversely, certain elements do interact to occasion proper students' meta-cognition in the learning environment, and the absence of such elements can also lead to poor educational performance within the learning environment. This study sought to examine academic self-efficacy, reinforcement, motivation, and meta-cognition of public senior secondary school students in Delta State, with students' age (old and young), class (SS1 and SS2), gender (male and female), and school location (urban and rural) mediating them.

Academic self-efficacy can be seen as the degree to which students believe they are capable of learning or accomplishing an academic task within a specific area of education (Foulstone & Kelly, 2019). Diverse studies have shown that self-efficacy and metacognitive learning strategies are positively correlated (Tembo, & Ngwira, 2016; Nasir & Iqbal, 2019; Luo, Chen, Yu, & Zhang, 2023). High academic self-efficacy has been associated with positive education outcomes such as enhanced learning, motivation, self-determination, and ultimately academic performance Foulstone and Kelly (2019). Students who believe they are capable of learning and doing their academic tasks are more effective in adopting metacognitive strategies to achieve learning objectives than students who do not maintain such optimistic beliefs (Hayat, & Shateri 2019). Reinforcement, or the use of rewards and consequences to shape behaviour, is a common instructional strategy used by teachers to promote student learning and motivation. Research has shown that reinforcement can have a significant impact on student metacognition. Reinforcement refers to an interaction (reward or punishment) between the teachers and students aimed at building a strong

behaviour and relationship for an effective teaching-learning process. Reinforcement implies an act of strengthening a student's positive attitude in the learning classroom by the teacher(s) (Fitriati, Fatmala & Anjaniputra, 2020). Motivation as one of the significant components of cognition plays an important role in students' conceptual change process, critical thinking, learning strategies, and achievement. According to Sardiman as cited in Puspitarini and Hanif (2019:53), "motivation is the driving force that arises in the students that lead to learning activities, ensuring the continuing of the learning process and, providing guidance in the learning process so that the learning objectives can be achieved".

Statement of the Problem

Studies have shown that students with poor metacognitive skills have teething troubles in comprehending the problem, choosing suitable strategies, and finding accurate answers. Additionally, it has been found that some of the biggest factors influencing students' metacognition towards learning are the quality of teachers, instructional methods and materials, in-service teachers' training programmes, guidance and counselling, and parent cooperation. However, poor learning environment, low student belief and inability to be self-aware, to see where he is succeeding and the area of difficulty, poor feedback, student personality, and intelligence level have also affected students' learning and metacognitive development. Most students in senior secondary schools in Delta State cannot brainstorm any longer. They depend on examination malpractice, and the use of artificial intelligence tools for answers. These days, the majority of the students depend on their teachers to write WAEC and NECO examinations while some of them have lost interest in learning as a result of the economic meltdown and the get-rich-quick syndrome exhibited by their fellow juveniles, hence many of them referred to education as a scam and internet fraud (Yahoo) as the ultimate. The ability of the students to think on their own is gradually going into extinction. Therefore, the problem of this study is to investigate how poor student metacognition can be

addressed through the influence of academic self-efficacy, reinforcement, and motivation for effective learning of public senior secondary school students in Delta State of Nigeria.

Research Questions

The following research questions guided the study:

1. 1.What is the relationship between academic self-efficacy and students' meta-cognition?
2. 2.What is the relationship between reinforcement and students' meta-cognition?
3. 3.What is the relationship between learning motivation and students' meta-cognition?

Methodology

The study adopted a correlational research design, with a population of 82,243 students in 477 public senior secondary schools (S.S.1&2) in the three senatorial districts of Delta State. A sample size of 540 senior secondary school students was selected through a multi-stage sampling procedure. Firstly, a simple random sampling technique of balloting was used to select three (3) local government areas in each of the three senatorial districts of Delta State, making it a total of 9 local government areas out of the 25 local government areas in the state. Subsequently, three (3) schools were selected in each of the 3 LGAs, making it a total of 27 schools out of the 477 secondary schools in Delta State. Thereafter, a quota sampling procedure was used to select twenty (20) students from each of the twenty-seven sampled schools giving us a total representation of 540 students respectively. Data were collected through a Likert modified questionnaire titled "Questionnaire on Academic self-efficacy, reinforcement, motivation and Meta-cognition of Senior Secondary School Students in Delta State" (QASRSMMSSSDS). The reliability of the instrument was established by using Cronbach's Alpha method and a reliability coefficient index of

8.22 was obtained. Data were analysed using the Mean statistics to answer the research questions and a mean of 2.50 was considered an affirmative response while a mean below 2.50 was rejected.

Presentation and Analysis of Data

Research Question 1: What is the relationship between academic self-efficacy and students' meta-cognition?

Table 1: The relationship between academic self-efficacy and students' meta-cognition.

/S/N	Items	SA 4	A 3	D 2	SD 1	N	Mean X	Decision
1	I am self-confident in my ability to study different conceptions in school.	135 (540)	293 (879)	87 (174)	25 (25)	540 (1618)	3.00	Agree
2	I trust I can shine in all my subjects.	74 (296)	146 (438)	215 (430)	105 (105)	540 (1269)	2.35	Disagree
3	I am assured of my capability to complete homework on time.	201 (804)	154 (462)	70 (140)	115 (115)	540 (1521)	2.82	Agree
4	I think I can handle difficult academic tasks.	183 (732)	179 (537)	123 (246)	55 (55)	540 (1570)	2,91	Agree
5	I am confident in my ability to participate in class discussions.	122 (488)	217 (651)	100 (200)	101 (101)	540 (1440)	2.67	Agree
6	I set specific goals for myself before starting a task.	169 (676)	212 (636)	92 (184)	67 (67)	540 (1563)	2.99	Agree

7	I make a plan to achieve my academic goals.	111 (444)	189 (567)	130 (260)	110 (110)	540 (1381)	2.56	Agree
8	I am motivated to learn because I want to achieve my goals.	138 (552)	189 (567)	95 (190)	118 (118)	540 (1427)	2.64	Agree
9	I believe that my effort, not just talent, determines my academic success.	66 (264)	125 (375)	240 (480)	109 (109)	540 (1228)	2.30	Disagree
10	I am willing to ask for help when I need it.	210 (840)	202 (606)	70 (140)	58 (58)	540 (1644)	3.04	Agree
							Criterion Mean (X) = 2.50	Average mean = 2.71

The results in Table 1 indicated that the respondents disagreed with items 2 and 9 of the questionnaire which revealed that a student can do well in all subjects; and that personal effort, not just talent, determines academic success. All other items were agreed by the respondents as the relationship between academic self-efficacy and students' metacognition with the mean scores of 3.00, 2.82, 2.91, 2.67, 2.99, 2.56, 2.64, and 3.04 respectively. Based on a criterion mean of 2.5 and above, the average mean of 2.71 confirms the affirmative response of the respondents on the relationship between academic self-efficacy and students' metacognition in public senior secondary schools of Delta State.

Research Question 2: What is the relationship between reinforcement and students' meta-cognition?

Table 2: The relationship between reinforcement and students' meta-cognition

/S/N	Items	SA 4	A 3	D 2	SD 1	N	Mean X	Decision
1	My teacher regularly acknowledges and praise my efforts in learning.	97 (388)	246 (738)	123 (246)	74 (74)	540 (1446)	2.67	Agree
2	My teacher provides constructive feedback to me in a sensible manner.	152 (608)	200 (600)	95 (190)	93 (93)	540 (1491)	2.76	Agree
3	My teacher encourages me to actively participate in classroom discussions and activities.	240 (960)	157 (471)	60 (120)	83 (83)	540 (1634)	3.03	Agree
4	My teacher always celebrates my achievements and successes, big or small.	100 (200)	73 (219)	231 (462)	136 (136)	540 (1217)	2.25	Disagree
5	My teacher encourages me to embrace challenges and learn from failures.	124 (496)	209 (627)	88 (176)	119 (119)	540 (1418)	2.63	Agree
6	My teacher fosters a supportive atmosphere where students feel comfortable asking questions and seeking help.	117 (468)	211 (633)	115 (230)	97 (97)	540 (1428)	2.64	Agree
7	I believe that giving	112	215	121	92	540	2.64	Agree

	me detention or extra assignments is effective in managing my misbehavior.	(448)	(645)	(242)	(92)	(1427)		
8	My teacher uses punishment in correcting misconduct among students.	184 (736)	233 (699)	50 (100)	73 (73)	540 (1608)	2.98	Agree
9	My teacher sometimes criticizes me to improve behavior in the classroom.	208 (832)	121 (363)	79 (158)	132 (132)	540 (1485)	2.75	Agree
10	Consistently applying consequences for misbehavior helps my teacher in maintaining classroom discipline.	81 (324)	96 (288)	250 (500)	113 (113)	540 (1225)	2.27	Disagree
	Criterion Mean (X) = 2.50						2.66	

The results in Table 2 indicated that the respondents disagreed with items 4 and 10 of the questionnaire which revealed that regular teachers' celebration of students' achievements and successes and consistent application of consequences for misbehaviour will reinforce students to think on their own. All other items were agreed by the respondents as the relationship between reinforcement and students' metacognition with the mean scores of 2.67, 2.76, 3.03, 2.63, 2.64, 2.64, 2.98, and 2.75 respectively. Based on a criterion mean of 2.5 and above, the average mean of 2.66 confirms the affirmative response of the respondents on the relationship between reinforcement and students' metacognition in public senior secondary schools of Delta State.

Research Question 3: What is the relationship between motivation and students' meta-cognition?

Table 3: The relationship between motivation and students' meta-cognition

/S/N		SA	A	D	SD	N	Mean	Decision
	Items	4	3	2	1		X	
1	I enjoy learning new things, even if they are challenging	200 (800)	188 (564)	62 (124)	90 (90)	540 (1578)	2.92	Agree
2	Comprehending how things work captivates me	214 (856)	163 (489)	91 (182)	72 (72)	540 (1599)	2.96	Agree
3	I feel proud when I overcome academic obstacles	165 (660)	141 (423)	126 (252)	108 (108)	540 (1443)	2.67	Agree
4	Ascertaining new ideas excites me	135 (540)	125 (375)	162 (324)	118 (118)	540 (1357)	2.51	Agree
5	Setting goals and achieving them motivates me to learn	238 (952)	201 (603)	70 (140)	31 (31)	540 (1726)	3.19	Agree
6	I enjoyed discussing what I have learned with others	223 (892)	188 (564)	82 (164)	47 (47)	540 (1667)	3.08	Agree
7	I like exploring topics that interest me, even if they are not part of my school curriculum	111 (444)	124 (372)	210 (420)	95 (95)	540 (1331)	2.50	Agree

8	Improving my skills and knowledge makes me feel more confidence	199 (796)	245 (735)	60 (120)	36 (36)	540 (1687)	3.12	Agree
9	I feel a sense of accomplishment when I master a difficult topic	208 (832)	251 (753)	55 (110)	26 (26)	540 (1721)	3.19	Agree
10	I believe that knowledge is power, and I want to empower myself	150 (600)	214 (642)	95 (190)	81 (81)	540 (1513)	2.80	Agree
Criterion Mean (X) = 2.50							2.89	

The results in Table 3 indicated that the respondents agreed with items 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 of the questionnaire. All the items were agreed by the respondents as the relationship between motivation and students' metacognition with the mean scores of 2.92, 2.96, 2.67, 2.51, 3.19, 3.08, 2.50, 3.12, 3.19, and 2.80 respectively. Based on a criterion mean of 2.5 and above, the average mean of 2.89 confirms the affirmative response of the respondents on the relationship between motivation and students' metacognition in public senior secondary schools of Delta State.

Discussion of Findings

The data analyzed in Table 1 for answering research question one (1) stated that the respondents agreed with items 1, 3, 4, 5, 6, 7, 8, and 10 on the relationship between academic self-efficacy and metacognition of students. The findings indicated that students are self-confident in studying different concepts in school, capable of completing their assignments on time, able to handle difficult academic tasks,

participating in class discussion, setting specific goals for themselves before commencing a task, planning to attain their academic goals, motivated to learn, and willing to ask for assistance when needed. Items 2 and 9 of the questionnaire disagreed that students can do well in all subjects, and their efforts, not just talent, determine their academic success. The summary of the findings above stated there is a significant relationship between academic self-efficacy and student metacognition in public senior secondary schools in Delta State. The findings of Hayat, Shateri, Amini, and Shokrpour (2020) conformed with the existing study, which revealed that a student's self-efficacy has an impact on his learning-related emotions and metacognitive learning strategies. This was buttressed by the discoveries of Hayat and Shateri (2019), which revealed that self-efficacy had a direct, positive, and statistically significant effect on metacognitive learning strategies. Correspondingly, the results of Hermita & Thamrin (2015) are consistent with the study that revealed that a positive relationship exists between metacognitive awareness and academic self-efficacy. Similarly, Koyuncuoglu (2023) found a positive association between the academic success of both metacognition and general self-efficacy, which was in line with the present study.

The data analyzed in Table 2 for answering research question two (2) stated that the respondents agreed with items 1, 2, 3, 5, 6, 7, 8, and 9 on the relationship between academic reinforcement and metacognition of students. The findings showed that teacher's regular acknowledgment and praise, constructive feedback, encouragement of student's active participation in classroom activities, encouragement of students to embrace challenges and learn from failures, supportive atmosphere for students to ask questions and seek help, giving extra assignments, using punishment measures to correct misconduct, student's behavior, and criticizing student's to improve behavior in the classroom reinforce student's efforts in learning. Items 4 and 10 of the questionnaire disagreed that regular teachers' celebration of students' achievements and successes and consistent application of consequences for

misbehaviour will reinforce students to think on their own. The summary of the findings above indicated that there is a positive significant relationship between reinforcement and students' metacognition of public senior secondary schools in Delta State. The findings of Irnasari (2023) correspond with the current study, which revealed that there are significant influences of teachers' classroom reinforcement and motivation on the students' reading ability. Also, the findings of Sugiyama, Schweighofer, and Izawa (2023) showed that reinforcement learning mediates recognition in implicit motor learning by augmenting students' performance through metacognitive processes, which increase rewards and decrease punishments.

The data analyzed in Table 3 for answering research question three (3) stated that the respondents agreed with items 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 on the relationship between motivation and metacognition of students. The findings indicated that students enjoy learning things even if they are difficult, and comprehending how things work captivates them to learn. Also, students feel proud when they overcome academic obstacles, learn new ideas, and are motivated to learn when their set goals are achieved; enjoy discussing what they have learned among themselves; explore topics that interest them outside the school curriculum; feel confident to improve their knowledge and skills; feel successful after mastering a challenging topic; and believe in empowering themselves through knowledge acquisition. The summary of the findings above stated there is a great significant relationship between motivation and student metacognition in public senior secondary schools in Delta State. The findings of Adamma, Ekwutosim, and Unamba (2018) conformed with the present study, which revealed that motivation improves the academic performance of the students and there is a gender difference in motivational type and academic performance. Also, the results of Naz, Shah, and Qayum (2020) correspond with the current study, which indicated that students' educational attainment is significantly affected by both intrinsic and extrinsic motivation.

Recommendations

The following recommendations are made based on the findings of this study:

1. Metacognitive training should be integrated into the educational curriculum of secondary schools in Delta State to enhance students' self-awareness, self-regulation, and self-evaluation skills.
2. The Delta State Education Commission should provide career development opportunities for teachers to enhance their knowledge of metacognition, self-efficacy, reinforcement, and motivation to promote students' metacognitive and academic self-efficacy skills.
3. Self-reflection and self-evaluation opportunities should be provided for students to regularly reflect on their learning, set goals, and evaluate their academic progress.

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