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Research Article

Effect of Immediate Feedback Strategy On The Mathematics Task-Persistence and Self- Efficacy Belief of Low Achieving Students: Implication For Educational Managers In The Need For Socio-Economic Development

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ABSTRACT

The rate at which academic achievement is dwindling in both internal and external examinations in Nigeria currently are a huge source of worry due to the importance of the subject. This study aimed at investigating the effect of immediate feedback on the task persistence and self-efficacy belief of low mathematics-achieving students in Imo State, Nigeria. The study was guided by three research questions and three null hypotheses. The study adopted a quasi-experimental, non-equivalent pretest–posttest control group method involving one experimental group and one control group. The sample size consisted of 145 senior secondary school two (SSSII) students identified as low mathematics achievers. The Participants were drawn from two public schools. The schools were randomly assigned to experimental and control groups. Two research instruments: The Mathematics Task Persistence and Self-Efficacy Belief Scale (MATPASEBS) and the Mathematics Achievement Test (MAT) were adapted, validated, trial tested, and used for data collection in this study. Mean, standard deviation, and analysis of covariance (ANCOVA) were used to analyze the data collected for the study. The study revealed that instructing low-achieving students using immediate feedback strategy has a significant effect on their mathematics task persistence and mathematics self-efficacy belief. Similarly, the study showed that immediate feedback strategy helped in improving participants' mathematics achievement. Based on the findings of this study, it was concluded that the use of immediate feedback strategy in teaching mathematics to low Mathematics-Achieving Students has the potential of enhancing their mathematics task persistence, mathematics self- efficacy belief, and mathematics achievement.

Keywords: Immediate Feedback; Mathematics; Self-Efficacy Belief; Task Persistence; Low Achieving Students.

Introduction

Mathematics

Mathematics is the bedrock of all science subjects. Mohamed and Al-Agili (2012) posited that mathematics is the basic pillar of any scientific progress. Mathematics is the science of numbers and shapes (Hornby, 2006). Mathematics, which is defined as the study of both abstract concepts and concrete objects, is one of the school subjects considered. extremely important for secondary school students in Nigeria and beyond. Greek

mathematics greatly refined the methods (especially through the introduction of deductive reasoning and mathematical rigor in proofs) and expanded the subject matter of mathematics. But the Arabians introduced many mathematics rules that are in use throughout the world to this day. The Middle Ages lit the light of mathematical creativity. The Renaissance that began in Italy gave birth to new mathematical development and scientific discoveries that continued till the present day (Orji, 2002). Since then, mathematics has occupied the epicenter of science and technological developments throughout the world. It is taught in schools as an essential and indispensable tool used in grooming students in many fields of study. These fields include physical science, engineering, medicine, management, education, and the social sciences. How mathematics cuts across different fields made Radovan (2006) says mathematics is certainly not Just a fixed body of knowledge, its growth is not confined to inventing new numbers but pervades every aspect of modern life. Mathematics is used for analyses in the world today. These assertions about mathematics appear to be true when one considers all the wonderful things that are done through computers. programme today.

It is a known fact that computer science is an offshoot of mathematics. Winheller, Hattie, and Brown (2013) opined that mathematics could be a science dealing with the study of quantities and their relationships expressed in numbers: Mathematics helps with counting. It helps measure. It helps compare things. Addition, subtraction, multiplication, and division are the basic operations of mathematics. Mathematics is the study of numbers, quantities, shapes, and measurements and how they relate to each other. Radovan (2006) posited that mathematics is a broad-ranging field of study in which the properties and interactions of idealized objects are examined. Mathematics will not be useful unless students achieve success in it and use its knowledge to solve their current and future problems.

Despite the importance of mathematics, there is a general belief that mathematics is hard, and whenever mathematics is mentioned, there is always an apprehension; what comes to the mind of students is that difficult subject. It is true that the signs, symbols, and multifarious formulas used In the subject, it makes it seem hard to many students. Most students complain that mathematics is a complex subject. This is due to the fact that they lack the basic mathematical skills required to do well in mathematics as a result of poor strategies used in teaching mathematics. Many students think that they cannot achieve success in mathematics no matter how they try.

The act of realizing and actualizing a set goal is called achievement. Achievement is one's capability to fulfill his or her natural potentials. It is an individual's ability to hit a target despite all odds. Achievement means accomplishment, especially by superior ability, special effort, great courage, or a great or heroic deed in spite of obstacles and discouragements (Wakgar & Teklu, 2013). Achievement is the realization of one's dreams of successfully completing a given task. Achievement means succeeding in doing something, especially after exerting a lot of effort. Based on the opinions above, one can conclude that academic achievement is a product of a student's persistence, effort, and resilience.

Mathematics achievement is the demonstration of competence, acquisition, learning, and knowledge representation in mathematics. Mathematics achievement is mostly determined psychometrically through the quantification of grades. Mathematics achievement is directly related to the score a student obtains in a mathematics test. These scores may be low, average, or high. If it is above average, we call it a high mathematics achievement, but if it is below average, we term it a low mathematics achievement. Mathematics achievement is affected by factors such as mathematics anxiety, students' mathematics task persistence, students' mathematics self-efficacy belief, gender, and teaching instruction. The report of the mathematics achievement by child left behind (NCLB, 2001) revealed that many learners have experienced mathematics anxiety in school at one time in life. The consequences of being anxious toward mathematics include mathematics avoidance and decline in mathematics achievement. All these and more cumulate. to the reason why mathematics achievement is poor and students have considerable difficulties with mathematical skills and concepts (Mbaugua 2012). Most scholars believe that a student must do well in so far as he or she puts in effort. works hard and persists in the face of mathematics difficulties to achieve success. Mathematics achievement is the realization of success through the acquisition of knowledge and the demonstration of persistence. Low-achieving Students tend to lack mathematical skill, competence, self-efficacy belief, and task persistence.

Low-Achieving Students

Low-achieving students are those learners who are currently having disabilities both in mathematics and other subjects (Doabler & Fien, 2013). Several factors may help to explain why. Some students achieve higher than others in mathematics. These factors may include students' personal and home backgrounds, resources for learning, time spent out of school studying or doing homework in school subjects, self-confidence in learning mathematics, motivation to learn mathematics, interest, curiosity, and persistence. It was found that having self-confidence in learning mathematics, having a large number of books at home, regularly using computers, and having a high positive association with mathematics achievement affects mathematics success among Malaysian students (Ismail, 2009).

Some studies indicated that a student's self-concept of ability in mathematics was a key predictor of mathematics achievement in many countries; other student variables include self- concepts, gender, parents' highest education level, perception of school, and persistence. Wang (2012) held that all the factors mentioned above differ in the magnitude of their relation to mathematics achievement across countries.

Akyuz and Berberoglu (2010) postulated that home education resources and teacher gender were not significantly related to mathematics. achievement in Belgium, the Slovak Republic, Italy, Lithuania, and Slovenia; however, female teachers were significantly related to lower achievement in the Czech Republic and Turkey and higher achievement in Hungary and the Netherlands. Wang (2012) posited that after controlling for student effects, teacher gender is not significantly associated with students' mathematics. achievement in Russia, Singapore, and South Africa, whereas male teachers are significantly related to higher mathematics achievement in the USA. As far as the relationship between teaching experience and mathematics achievement is concerned, a negative association was identified in the Slovak Republic and Slovenia (Akyuz & Berberoglu, 2010), but a positive one in the Netherlands, Turkey (Akyuz & Berberoglu, 2010), and South Africa (Wang, 2012). At the school level, good attendance at school, availability of school as perceived by mathematics instruction, and school climate as perceived by principals are usually considered as important factors related to high or low mathematics achievement. Ghagar, Othman, and Mohammad (2011) opined that school location, availability of school resources for mathematics instruction, and good attendance at school climate as perceived by principals were significantly associated with the low or high mathematics achievement of eighth graders in Malaysia after controlling for other variables; in Singapore, school climate as perceived by principals was significantly related to mathematics achievement. but availability of school resources for mathematics instruction and good attendance at school were not so, after controlling for other student-level and classroom-level variables.

Reviewed literature shows that many factors affect students' mathematics achievement; however, findings about the main causes of low mathematics achievements are controversial and inconclusive. The major feature of mathematically low-achieving is repeated low achievement in mathematics tests. Such students avoid mathematics at all costs as a result of fear. Low mathematics achievers are students who consistently score below average on every test. This is due to the fact that they lack both mathematics self-efficacy belief and mathematics task persistence. Some researchers tend to attribute low mathematics achievement to students' low task persistence.

Task Persistence

Task means undertaking, while persistence is synonymous with perseverance. Thus, an individual's ability to resist difficulties posed by an undertaking is called task persistence. Task persistence is defined as continuing with a task despite obstacles or difficulty. (DiCerbo, 2014).

Task persistence is simply the ability to stick with something in spite of distractions and discomforts. Persistence on challenging tasks indicates attentional control and the ability to regulate emotional and behavioral impulses (Mägi et al., 2018). Task persistence tells us that students who struggle to study put in effort and work hard to overcome their academic challenges and outperform their peers. Task persistence, setting a target, and recording achievement can be powerful ways to help a student maintain a constant frequency of defeating an undertaking. Task persistence can become a self-competitive strategy that can aid a student to work hard in life. Encouragement received from others when we achieve highly or poorly is a strategy. We can always employ it to do better. It can be a real boost and reenergize a student to persist in a task. Task persistence teaches students to learn how to set goals, accept the presence of pain, and work so hard as if they ignored it in the past.

Persistence is of particular interest to the researchers because persistence at a young age has proved to be the determinant of employment outcomes and adult educational attainment (Anderson & Bergman, 2011). The relationship between persistence and academic achievement has been repeatedly documented as a positive correlate (Boe, May, & Boruch, 2002; Deater-Deckard, Petrill, Thompson, & Dethome, 2005; McClelland, Acock, Piccinin, Rhea, & Stallings, 2012). In the cognitive literature, persistence is generally classified as an element of executive function and thought to be related to self-regulated attention, cognition, and enduring behavior (Anderson, 2002).

Academic achievement predicts students' persistence on academic tasks. A two-year-old child who spent more time trying to open a glass box containing a toy was found to have fewer behavior problems and was more likely to complete school work at age 5 (DiCerbo, 2014). McClelland et al. (2012) reported that parents' ratings of their children's persistence with difficult toys predicted college completion by age 25, suggesting valid, reliable measures of persistence may help us monitor and intervene with an aspect of learners that can significantly impact their future success. Duckworth and Kern (2011) said that learning is hard; it is often daunting, exhausting, and discouraging, but true learning is fun, exhilarating, and gratifying. People who accomplished great things often combined a passion for a single mission with an unswerving dedication to achieving that mission, despite whatever the obstacles may be and however long it might take.

A good teacher can help his or her students manage their pain by encouraging them to persevere. Encouragement has a way of affecting students' task persistence positively. McCracken (2007) posited that students who achieve success in their school are mostly those who have the spirit of persisting on tasks. Students who are task persistent tend to be both task involved and achievement-motivated; such students seek appropriate help, use deeper cognitive strategies, and approach mathematics tasks with zeal and confidence (Kaplan & Maehr, 2007). Task persistence is the resilience and spontaneity before an undertaking. Most often, an individual's level of task Persistence is influenced by his or her self-efficacy belief.

Self-Efficacy Belief

It is important for individuals to have confidence in their abilities to get things done right. Self-efficacy belief works magic just like optimism helps people realize their dreams and potentials. Self-efficacy belief is the trust people have in themselves that they are capable of performing in a certain manner to attain a set goal (Bandura, 2008). Albert Bandura (1977) posited that self-efficacy belief is an individual's belief that he/she can master a situation and produce positive outcomes in a" community. Self-efficacy Belief is the belief that "I can". Self-efficacy is people's belief in their capabilities to organize, execute, and achieve success in a particular task (Bandura, 1997). Self- efficacy beliefs are the beliefs individuals have about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. It is a belief that one has the capabilities to execute the courses of action required to manage prospective situations (Smith & Betz, 2000). Self-efficacy beliefs are individuals' trust in their abilities to solve a problem. Self-efficacy beliefs are the expectations people have that they can perform a task (Pajares & Schunk, 2001).
Efficacy, competence, or effectiveness is the power to produce effects or do something well. It is pupils' judgment of their capabilities based on mastery criteria. Pajares and Schunk added that
Self-efficacy belief is a sense of people's competence within a specific framework, focusing on the individual's assessment of their abilities to perform specific tasks in relation to goals and standards rather than in comparison with others' capabilities (Rushi, 2007). Woolfolk (2010) said that Self- efficacy is a person's sense of being able to deal effectively with a particular task. It is a belief about one's personal competence in a particular situation. Self-efficacy refers to people's conviction that they can achieve a specific goal (Weiten & Lloyd, 2000). Bandura (1997) emphasized that Self- efficacy belief is a critical factor in whether or not students achieve. He maintained that self- efficacy has much in common with mastery, motivation, and intrinsic motivation. Self-efficacy beliefs determine how people feel, think, achieve, believe, and motivate themselves. Self-efficacy beliefs are pupils' trust in their capabilities to solve a given problem without external help. Self- efficacy beliefs can be activated in a student with the help of immediate feedback.

Immediate Feedback

Immediate feedback (IFB) is the process of offering an on-the-spot correction to students alongside teaching and learning. IFB is a strategy employed to facilitate comprehension and practical learning by correcting students in the classroom as soon as they commit an error. It is a technique that promotes learning and corrects inaccurate responses (Epstein et al., 2002). It is imperative to provide a kind of feedback that will meet students' needs. Immediate feedback is necessary for academic improvement and success of below-average students.
How teachers provide feedback to students has a way of determining students' achievement and improvement. Teachers who combine strong subject knowledge with effective feedback tend to offer students rich and focused information about their learning and how to improve it. Students who are clear about their learning can monitor their progress and seek feedback to improve their learning. Scholars like Ceri, Hubbell, and Stone (2012) are of the view that feedback seems to be more effective when learning is still on. Good teachers carefully gauge when feedback is needed to promote learning. Trained teachers use the kind of feedback that best meets the needs of the students. Good teachers provide strategies to help the student to improve. Good teachers allow their students to independently act on feedback to improve their learning. Effective feedback takes place as a conversation. Good teachers check the adequacy of their instruction and skill through the feedback. They offer and receive from their students.

Immediate feedback that helps students to know how to improve their achievement tends to require teachers to understand learning objectives (Stiggins, Arter, Chappuis & Chappuis, 2006). If teachers do not understand learning objectives, it will be difficult for them. to provide the students with the information about what achievement looks like. If a student's achievement falls below average, it means that his or her teacher is operating a faulty instrument (Hattie & Timperley, 2007). Students should be provided with the kind of information that will help them fill in missing information and clarify misunderstandings. Clarke (2003) is of the view that effective feedback is a medium through which teachers can collect data in order to improve students' learning and achievement.

It is awful that despite the usefulness of feedback as a vital tool of instruction, the school has been neglected by many teachers. Hattie (1999; 2012) opined that despite the importance of feedback, both in academic and in a practical stance, effective feedback in the classroom does not occur very often. Similarly, the National Research Council (2000) posited that the importance and power of feedback to enhance teaching and learning, feedback opportunities are scarce in most classrooms. Teachers need to explain to students how best to do things at all times. It is imperative that teachers say what students did well and sandwich constructive criticism with positive feedback despite students' level of achievement; hence, the goal of this study is to investigate the effect of immediate feedback on the mathematics achievement of low-achieving senior secondary school students in Nigeria.

Methods

Study Setting

This study was conducted in 2 public secondary schools in southeastern Nigeria. The schools were located in semi-urban areas. of the region. Socio-economic and cultural activities thrive well in the region, as the people of the area are known to be hard-working.

Participants

One hundred and forty-five (145) SSSII students (79 females and 66 males) identified as low mathematics achievers were drawn from two public schools and used for the study. The participants were predominantly Nigerians who accepted to be part of the research study. The treatment group was made up of 74 low mathematics students, while the control group comprised 71 low mathematics students. The study adopted a randomized pretest, posttest, control group design. The experimental group received immediate feedback (IFB). intervention on mathematics task persistence and mathematics self-efficacy belief.

A pretest-posttest randomized experimental design for the study. A pretest-posttest randomized experimental design is a type of experiment where participants get randomly assigned to either receive an intervention (the treatment group) or not (the control group). The outcome of interest is measured two times or once before the treatment group gets the—the pretest—and once after it—the posttest. The design is considered suitable in this study because intact or existing groups were used for experimental and control groups. Pretest-posttest randomized experimental design is used in real-life conditions and investigations, where there are existing groups like we have in this study.

The design and symbols are represented thus:

Experimental Procedure

Groups	Pretest	Treatment	Posttest	Follow-Up-Test
Experimental Group	P_1	X_1	P_2	Z_1
Control Group Key;	P_1	X_0	P_2	Z_1

P_1 = Pretest

X_1 = Treatment (Immediate Feedback)

X_0 = Control Group (No Treatment, but Conventional Method) P_2 = Posttest

Z_1= Follow-Up-Test

Immediate Feedback (IFB) packages were used to emit information to the subjects on how to Immediate Feedback (IFB) packages were used to emit information to the subjects on how to improve their Mathematics Task Persistence, Mathematics Self-Efficacy and Mathematics achievement. The Mathematics Self-Efficacy Scale (MSES) developed by Betz, and Hackett (1983) was adapted by the current researchers and was modified to suit the educational curriculum and variations of Nigeria and used to elicit information from the participants on their Mathematics Task Persistence, Mathematics Self-Efficacy Belief and Mathematics achievement. MSES consisted of 75 items, 30 representing math tasks and 18 Mathematics Self-Efficacy Scale. MSES was modified to form Mathematics Task Persistence and Self-Efficacy (MATPASEBS).

MATPASEBS and Mathematics Achievement Test (MAT) were used for data collection in this study. MATPASEBS was used to elicit information on students' ability to persist on Mathematics tasks and students' believe in their abilities to conquer a Mathematics tasks, while the Mathematics Achievement Test (MAT) was developed by the researchers, validated by experts in the field of Mathematics and trial tested to suit the Educational standard and Mathematics scheme of work in Nigeria before being used for the study. The MAT used in this research study contains section "A and B". Section "A" elicited information on participants' bio-data while section "B" which contains 25 items (Mathematics objective questions and answers) was used to elicit information on the participants' level of Mathematics achievement before and after the experiment with Immediate Feedback (IFB).

Before the commencement of the research study, the researchers sought the consent and cooperation of the principals and students of the schools selected for the study. The intention was to enable the school integrate the research programme into the school schedule without disrupting the later. The researchers achieved that by meeting the principals of the schools on the first day of school resumption and explained to them the purpose of the study and the benefits that could be derived from the study, if it is properly conducted.

On request, the principals introduced the researchers to their Mathematics teachers who served the research assistants. The researchers also explained to them the purpose of the research study and then solicited their cooperation. The researchers and the research assistants scheduled time for training. Thereafter, the researchers trained his research assistants. The two teachers received their training separately from each other. The training was concluded before the teachers were involved the in the research study, that was done to ensure that the teachers knew what to do and how to do it well. The researchers were not directly involved in the data collection, but gave the validated lesson plans, test questions, and the marking schemes to the research assistants for the treatment and control groups.

The researchers met the Senior Secondary School two (SSSII) form teachers in the two schools selected for the study to help him identify the low mathematics-achieving students in the classes. The teachers reported

that more than 98% of their students are low mathematics achievers. However, they listed the names of a few students in the senior secondary school II classes who were high mathematics achievers and showed them to the researchers without the knowledge of the students. That enabled the researchers to sort out the scripts of the low mathematics-achieving students in the classes after the tests.

The pre-test, treatment and post-test were held during the normal lesson periods in the school time table. The experimental group lesson plan was used to teach SSS II students in Enyiogugu Secondary School (which is the treatment group) on each mathematics lesson period, for four weeks, while the control group lesson plan was used in teaching in Nguru Secondary Technical School (which is the control group) each mathematics lesson period, for four weeks. While immediate feedback strategy was entrenched in the experimental lesson plan, the conventional feedback which is given at the end of a topic was embedded in the control group lesson plan.

The teachers administered the research instruments to the students for pre-test; that is, before commencing the treatment. The pre-test scores were used as covariates to the students' post-test scores. After the pre-test, the researcher reshuffled the items in the MAT for the post test. The post-test was administered in the fifth week after the treatment had been concluded. The research assistants administered the tests under the guidance of the researcher. Each group held their instruction classes for 40 minutes each day, three times a week, according to the school timetable. The researchers supervised the teachers' use of lesson plans. Effort was made by the researcher to minimize cheating by the subjects (students) during the mathematics tests. The three research instruments were administered to the respondents by the researchers with the help of two research assistants (Mathematics Teachers) to facilitate the study. After the tests, the administered instruments were collected back from the respondents immediately after they had responded to. That was done to avoid loss of the instruments.

Results

Table1 *Pretest post test of mean score mathematics task persistence of low achieving students exposed to immediate and conventional feedbacks*

Variable Feedback Strategies	N	Pretest		Posttest		Follow-Up-Test	
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
IFB	74	1.70	0.16	3.53	0.28	3.57	0.21
CFB	71	1.79	0.19	1.78	0.20	1.77	0.17

The result presented in Table 1 shows the variations in the pre-test, post-test, and follow-up mathematics task persistence mean scores of respondents exposed to immediate feedback (IFB) and those not exposed to it. The result indicates a pre-test mean score of 1.70 and standard deviation of 0.16 for the treatment group and a 1.79 mean score and a standard deviation of 0.19 for the control group. Similarly, the result indicates a post-test mean score of 3.53. and a standard deviation of 0.28 for the treatment group and a mean score of 1.78 and a standard deviation of 0.20 for the control group. After three months of the study, follow-up data was collected to determine whether the participants were still stable or not. The data collected as a follow-up indicates a mean score of 3.57 and a standard deviation of 0.21 for the treatment group and a mean score of 1.77 and a standard deviation of 0.17 for the control group. The increase in the mean of the respondents in the treatment group from 1.70 to 3.53 and consequently to 3.57 was as a result of IFB strategy intervention. The result shows that IFB is really effective in improving students' mathematics task persistence. To further address the research question, the following hypothesis was raised.

Table 2 ***Analysis of Covariance (ANCOVA) of mean mathematics task persistence scores of low achieving students exposed to (IFB) and (CFB) as measured by Mathematics Task Persistence and Self-Efficacy Belief Scale (MATPASEBS).***

N	D.f	Mean Square	Std Error Mean	F	Sig
145	144	3.55	1.21	5.67	0.00

The result in Table 2 shows an F-ratio of 5.67 with an associated probability value of 0.00 that was obtained with regard to treatment as the main effect on the mean mathematics task persistence of the respondents. The mean scores of low mathematics-achieving students who received immediate feedback (IFB) and those exposed to no treatment varied significantly. Since the associated probability (0.00) was less than 0.05 set as the benchmark for taking a decision, the null hypothesis (H01), which stated that IFB has no significant effect on mathematics task persistence, was rejected.

The inference drawn is that IFB has a significant effect on the mathematics task persistence of the respondents who received it, as it increased the mathematics task persistence of the subjects in the treatment group significantly.

Table 3 ***Pretest post test of mean score mathematics self-efficacy of low achieving students exposed to immediate and conventional feedbacks***

Variable Feedback Strategies	N	Pretest $\bar{x}$	SD	Posttest $\bar{x}$	SD	Follow-Up-Test $\bar{x}$	SD
IFB	74	2.00	0.24	3.59	0.33	3.61	0.37
CFB	71	1.94	0.23	1.92	0.20	1.93	0.21

The result presented in Table 3 shows the variations in the pre-test, post-test, and follow-up mathematics self-efficacy mean scores of respondents exposed to immediate feedback (IFB) and those not exposed to it. The result indicates a pre-test mean score of 2.00 and a standard deviation of 0.24 for the treatment group and a 1.94 mean score and a standard deviation of 0.23 for the control group. Similarly, the result indicates a post-test mean score of 3.59 and a standard deviation of 0.33 for the treatment group and a mean score of 1.92 and a standard deviation of 0.20 for the control group. After three months of the study, follow-up data was collected to determine whether the participants were still stable or not. The data collected as a follow-up indicates a mean score of 3.61 and a standard deviation of 0.37 for the treatment group and a mean score of 1.93 and a standard deviation of 0.21 for the control group. The increase in the mean of the respondents in the treatment group from 2.00 to 3.59 and consequently to 3.61 was as a result of IFB strategy intervention. The result demonstrates that IFB was really effective in improving students' mathematics self-efficacy belief. To further address the research question, the following hypothesis was raised.

Table 4 ***Analysis of Covariance (ANCOVA) of mean mathematics self-efficacy belief scores of low achieving students exposed to (IFB) and (CFB) as measured by Mathematics Task Persistence and Self-Efficacy Belief Scale (MATPASEBS).***

N	D.f	Mean Square	Std Error Mean	F	Sig
145	144	3.58	2.41	6.10	0.00

The result in Table 4 shows an F-ratio of 6.10 with an associated probability value of 0.00 that was obtained with regard to treatment as the main effect on the mean mathematics self-efficacy belief of the respondents. The mean scores of low mathematics-achieving students who received immediate feedback (IFB) and those exposed to no treatment varied significantly. Since the associated probability (0.00) was less than 0.05 set as the benchmark for taking a decision, the null hypothesis (H_{02}), which stated that IFB has no significant effect on mathematics self-efficacy belief, was rejected. The inference drawn is that IFB has a significant effect on the mathematics self-efficacy belief of the respondents who received it, as it increased the mathematics self-efficacy belief of the subjects in the treatment group significantly.

Table 5 ***Pretest post test of mean score mathematics achievement of low achieving students exposed to immediate and conventional feedbacks***

Variable Feedback Strategies	N	Pretest $\bar{x}$	SD	Posttest $\bar{x}$	SD	Follow-Up-Test $\bar{x}$	SD
IFB	74	1.60	0.15	3.48	0.32	3.52	0.34
CFB	71	1.63	0.17	1.62	0.16	1.61	0.13

The result presented in Table 5 shows the variations in the pre-test, post-test, and follow-up mathematics achievement mean scores of respondents exposed to immediate feedback (IFB) and those not exposed to it. The result indicates a pre-test mean score of 1.60 and standard deviation of 0.15 for the treatment group and a 1.63 mean score and a standard deviation of 0.17 for the control group. Similarly, the result indicates a post-test mean score of 3.48 and a standard deviation of 0.32 for the treatment group and a mean score of 1.62 and a standard deviation of 0.16 for the control group. After three months of the study, follow-up data was collected to determine whether the participants were still stable or not. The data collected as a follow-up indicates a mean score of 3.52 and a standard deviation of 0.34 for the treatment group and a mean score of 1.61 and a standard deviation of 0.13 for the control group. The increase in the mean of the respondents in the treatment group from 1.60 to 3.48 and consequently to 3.52 was as a result of IFB strategy intervention. The result depicts that IFB was really effective in improving participants' mathematics achievement. To further address the research question, the following hypothesis was raised.

Table 6 *Analysis of Covariance (ANCOVA) of mean Mathematics Achievement scores of low achieving students exposed to (IFB) and (CFB) as measured by Mathematics Achievement Test (MAT)*

N	D.f	Mean Square	Std Error Mean	F	Sig
145	144	3.50	2.13	4.11	0.00

The result in Table 6 shows an F-ratio of 4.11 with an associated probability value of 0.00 that was obtained with regard to treatment as the main effect on the mean mathematics achievement of the respondents. The

mean scores of low mathematics-achieving students who received immediate feedback (IFB) and those exposed to no treatment varied significantly. Since the associated probability (0.00) was less than 0.05 set as the benchmark for taking a decision, the null hypothesis (H_{03}), which stated that IFB has no significant effect on mathematics achievement, was rejected. The inference drawn is that IFB has a significant effect on the mathematics achievement of the respondents who received it, as it increased the mathematics achievement of the subjects in the treatment group significantly.

Discussion

The findings of this study were discussed in line with the research questions and hypotheses raised in the study. These were discussed under the following subheadings: Effectiveness of immediate feedback on mathematics task-persistence of low achieving students.

Analysis of post-test data collected from the experimental school classroom depicted that the use of immediate feedback strategy had a significant effect on the task persistence of low-achieving students. It was revealed that the group that was taught mathematics with the immediate feedback strategy performed significantly better than the group that learned mathematics with the conventional feedback method of teaching Mathematics in Nigeria, as they were able to persist in the face of difficult mathematics tasks and were able to conquer them and achieve success.

This result is in conformity with the earlier research findings of Starks (2011), who studied the relationship between feedback and task persistence of elementary school pupils in New York and found that feedback enhances one's persistence to learn. The result of the current study is in harmony with the study of Boe and Boruch (2002) on students' task persistence and the effect of different forms of feedback on the mathematics achievement of primary five pupils identified as experiencing difficulties in learning mathematics in Enugu E in the Third International Mathematics and Science Study (TIMSS), which revealed that persistence increases students' ability and motivation to perform a task. Another study undertaken in Tehran by Maryam, Elaheh, and Alireza (2008) showed that task persistence has a high correlation with mathematics achievement. Conversely, a study conducted in Dublin by Sinead, Joan, and O'Shea (2008) revealed inconsistent results.

Result on the effectiveness of immediate feedback on the mathematics self-efficacy belief of low achieving students. The findings of this study revealed that immediate feedback has a significant effect on the mathematics self-efficacy belief of low mathematics-achieving students. The result indicates immediate feedback significantly and positively improves students' mathematics self-efficacy belief. The result of the current study agrees with the findings of the study conducted in Singapore by Qian (2007), which showed that self-confidence significantly affects students' willingness to learn and do well in mathematics. Similarly, Nicolidau and Philippou (2002) found a strong relationship between self-efficacy belief and mathematics. Immediate feedback strategy significantly improved participants' mathematics achievement in the same manner.

Conclusions

The following conclusions were made based on the findings of the study: The use of immediate feedback in teaching mathematics enhanced participants' mathematics task persistence, self-efficacy, and achievement of low-achieving students. This conclusion is based on the findings of this study, which revealed a significant difference in the mathematics achievement of low-achieving students exposed to immediate feedback instruction and those exposed to conventional feedback.

Recommendations

Based on the findings of this study, the researchers made the following recommendations: Students should be exposed to immediate feedback during mathematics teaching and learning interactions in the classroom so that they will be able to participate actively in the teaching-learning process. That is to say that immediate feedback should be incorporated into teacher education programs to prepare the prospective teachers on how to use the strategy.

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