USING AFTER SCHOOL PROGRAMME TO IMPROVE MATHEMATICS ACHIEVEMENT AND ATTITUDE AMONG GRADE TEN LOW ACHIEVERS

Simeon O. Ariyo and Joshua O. Adeleke
Institute of Education, University of Ibadan, Nigeria

Abstract: *Importance of mathematics in technological development of any nation requires that more attention be given to students with consistent failure in the subject. This study established the effectiveness of an after school programme among low learners in mathematics. Pre- and post-test, control group quasi-experimental design was used for the study. Participants (grade 10, ages 14-15 students) who scored 40% and below in the diagnostic assessment were selected across the four schools for the experiment. Two schools each were randomly assigned to control (conventional) and treatment (use of diagnostic assessment followed by the after school programme) groups. A total of 95 participants (49 males and 46 females) formed the sample for the study. Four research instruments were used. A t-test was used for the analysis. No significant difference in students' achievement and attitude was evident before treatment; however, there was significant effect of treatment on students' posttest mathematics achievement* $t_{(93)}=9.22, p<0.05$ *but not on attitude. Teachers are encouraged to use diagnostic assessment to identify students with learning needs and use after school programme to enhance their performance.*

Key words: diagnostic assessment, after school programme, low learners, intervention programme

Background to the Study

The number of courses for admission in Nigeria universities that do not require at least a pass in mathematics is reducing on yearly basis. Thus, students without good knowledge of mathematics will find it difficult to progress in their education. It is even possible to have some students in science classes in secondary schools dreading mathematics, not to talk of students in art, social, and commercial classes that see mathematics as an abstract subject. Some of these students have difficulty in basic skills. Moors, Weisenburgh-Snyder and Robbins (2010) found that topics like number sense, number operations, and word problem-solving, which are basic skills in mathematics, are areas where students' difficulties and disabilities generally appear. Therefore, most researchers base mathematics intervention research on learning the basics in mathematics where low-achieving students are more vulnerable and therefore require intervention that will help them do well. The failure rate seems to be more among those with history of low achievement in mathematics (Ezeahurukwe, 2010; Umaru, 2010).

Studies (e.g., Adewale & Anjorin, 2012; Afemikhe, 1985) revealed how students could be helped with formative assessment, feedback, and remediation. Low learners with consistent low achievement may not benefit from this process because of the fundamental problem they have with the basic skills. The root cause of their failure ought to be ascertained through diagnostic assessment and reported to them before mapping out strategies to help them out of the challenge. Bardwell (1981) revealed in a study that students become intrinsically motivated and ready to improve in their learning when they are aware of the exact problem and learning strategy that can help them. Diagnostic assessment is essential to identify specific areas of need of these students in terms of basic skills.

Diagnostic assessment is an important tool for teachers to carry out teaching assignments effectively. It involves analysing student's knowledge and skills in a particular learning aspect. Identifying students in this category and their areas of difficulty is very crucial to the success of any intervention approach. Every assessment is directed towards measuring teaching and learning effectiveness (Joshua & Ikiroma, 2013). Suwarto (2013) further emphasized the importance of diagnostic assessment in the area of understanding students' learning difficulties together with possible errors in learning. Dryn (2007) concluded that diagnostic assessment is most relevant in a subject where basic knowledge is needed to understand higher skills. Low learners are lacking in basic knowledge of mathematics and that is the reason they could not comprehend what they are being taught in class; thereby, preventing them to move at the same pace with their peers.

When students are identified with their specific areas of need for an intervention programme, they tend to concentrate on their weak areas and are at liberty to ask questions without the fear of being ridiculed. One such intervention programme that could aid better understanding among low-learners is an after school programme (ASP). ASP is a specific programme for students who are consistently performing below the expected standard in their academic school work/studies to improve their performance. It involves identification of low-achieving students through diagnostic assessment and utilizing approaches such as diagnostic testing, feedback, remediation, and additional exercises to improve performance. It also requires identifying the prerequisite or basic knowledge that is lacking through students' responses to the diagnostic assessment and then leads them to understand the basic knowledge. An intervention programme that is well organised is assumed to increase the confidence and interest of the participants and thereby increase their performance.

Literature Review

Theoretical Background

The study adopted Gagné's (1971) theory of learning. According to Gagné, the level of prerequisite skills acquired by students may differ. Therefore, instruction must meet the needs of the individual student. Gagné argued that a set of ordered intellectual skills make up an instructional plan for teaching a specific concept. Mastery of lower level skills would promote deeper understanding and acquisition of more complex skills. Though Gagné's learning hierarchy presents a fixed learning sequence, all students may not have attained mastery of lower level pre-requisite skills. This lack of foundational knowledge necessitates creating multiple entry points where different students may enter into the learning sequence. These multiple entry points require the teacher to assess students' abilities and skills to determine each student's position within the learning hierarchy in order to tailor instructions by the learning tasks. Unless instruction begins at each student's individual level, the student will not acquire the necessary skill to solve complex problems related to the learning. It is, therefore, necessary to identify students with a consistent low achievement in mathematics with their prerequisite knowledge needs in order to prepare instruction suitable for their learning.

After School Programme

An ASP is meant to complement school academic work outside regular school hour. A well-planned ASP is capable of increasing students' confidence, competence, interest, and academic achievement gain. Mahoney, Lord, and Carryl (2005) analyzed academics and ASPs and found a significant improvement in students who participated in ASPs compared with their counterparts who did not. In ASPs, students have another opportunity with what they have been taught during school day and the materials they have seen. It gives them another chance to listen more attentively and interact effectively with the necessary materials. According to Malone (2007), a well-prepared ASP can provide a conducive environment for the participating students.

Programmes that are demanding and provide relevant activities can provide positive academic outcomes (Shernoff, 2010). Neuman (2010) reported that after-school programmes should offer choices and foster students' talents. Low achieving students will have the choice of concentrating on those specific learning difficulty areas during an after-school programme. They will improve on these areas and thereby bridge the gap between them and their high achieving colleagues.

Diagnostic Assessment

Ajogbeje (2012) found that diagnostic assessment, feedback, and directed remediation improved achievement. Another study on the effect of diagnostic assessment and feedback approaches in enhancing achievement in mathematics found that it improved academic performance of the participants (Ofem, Idika, & Ovat, 2017). Students who are struggling to do well in mathematics every session need an intervention programme to overcome their learning challenges. When students are shown their areas of learning difficulties, correct them with timely feedback and remediation, learning increases in terms of cognitive, affective, and skill gains (Ofem et al., 2017).

Diagnostic assessments are carried out to determine specific topics that needs to be remedied (Stecker & Fuchs, 2000). Ariyo (2017) found that diagnostic assessment can identify specific content, topic, and/or cognitive deficits (e.g., remembering, comprehension or understanding, and thinking) in students. To aid in instructional design, diagnostic tests should measure students' competence on components embedded within the theoretical model of learning (Gregoire, 1997). Such diagnostic assessments identify specific deficits or persistent misconceptions in students' requisite pre-skills or knowledge. Several component abilities must be covered when developing a diagnostic assessment in a subject. Ariyo (2017) further emphasized that diagnostic assessment should be carefully constructed to give room for students to commit errors. The focus of diagnostic assessment is to know the learners' area of difficulty more than how much they know.

Students' Attitude towards Mathematics

Attitude towards mathematics is described as emotional dispositions to the subject, which could either be positive or negative (Zan & Di Martino, 2007). Students with positive dispositions are likely ready to give all it takes to understand the subject in terms of rapt attention in class, prompt response to assignment, special interest of the teacher, etc. Whereas, students with negative dispositions desire that teachers will not come for the period. They neither pay attention when the teacher is available nor are willing to do necessary assignments in the subject.

Attitude towards mathematics is seen as a multifaceted experience that is characterised by students' emotions, which are linked with mathematics. Tendency to be unwilling or eager to learn mathematics is an indication of attitude displayed towards a subject. When students are provided with appropriate intervention programme such as ASP that could take care of their areas of need, they tend to develop positive attitude and thereby eager to be in mathematics class rather than being indisposed to the subject (Zan & Di Martino, 2007).

Purpose of the Study

Several research works have been carried out to minimize poor achievement in mathematics and negative attitude towards mathematics among low-achieving students (Adewale & Anjorin, 2012; Cunningham, 2016; Obaitan & Adeleke, 2007). However, a need exists to empirically establish the degree of the effect of an ASP on achievement and attitude of low-achieving students using a diagnostic assessment approach in identifying these low-achieving students and their areas of difficulties such as their prerequisite knowledge in mathematics. This study, therefore, used a treatment which employed systematic combination of diagnostic assessment (to identify low-achieving students and their prerequisite areas of need in mathematics) followed by an ASP to enhance their mathematics achievement and attitude.

Research Hypothesis

1. There is no significant difference in mathematics achievement of students exposed to treatment, and those without the treatment.
2. There is no significant difference in attitude of students exposed to treatment, and those without the treatment.

Methodology

The study adopted a pre-test/post-test, control group quasi-experimental design method. Two local government areas (LGAs) were randomly selected from each educational zone in Ibadan metropolis, Nigeria. Two schools each from the two LGAs were randomly selected. A total of 246 participants underwent the diagnostic assessment out of which 95 participants (49 males and 46 females) who needed an ASP were identified using a 40 percent score as the benchmark across the four schools. The schools were randomly assigned to treatment or control. Senior Secondary 1 students with an age group range between 13-15 years constituted the sample for the study.

Instruments

The following instruments were used for the study: (a) Diagnostic Assessment; (b) Mathematics Achievement Test 1 (pretest); (c) Mathematics Achievement Test 2 (posttest); (d) Pre-remediation Diagnostic Scale; (e) Remediation Instrument; and (f) Student Attitude Questionnaire.

Diagnostic Assessment. The instrument was constructed by the researcher using a test blue print. A test blue print also called table of specification helps to represent contents and cognition of targeted items in the appropriate proportion. One hundred and fifty multiple choice items with four options **(**A, B, C, D**)** were generated from junior secondary schools I, II, and III mathematics syllabi. These items are prerequisite knowledge required in Senior Secondary 1 **(**SS1**)** work. The generated items were given to mathematics experts as well as experienced secondary school mathematics teachers for vetting. After carrying out necessary amendments based on suggestions and corrections made, the items were trial tested on one hundred SS1 students from co-educational schools similar to the targeted sample to establish both the difficulty and discriminating indices of each item. These steps were taken to ensure the validity of the instrument. All the 82 items that had difficulty indices between 0.40 and 0.60 and discriminating indices of 0.3 and above were finally selected and used for the study. The reliability coefficient was determined using Kuder-Richardson (KR-20), and the reliability coefficient was 0.89. The 82 items were systematically divided into three sections (27, 27 and 28) to contain content and cognition in the same proportion. This step was done using the table of specification systematically. The administration of the instruments was completed three times within two weeks. Any student who scored 40 percent and below consistently in the three assessments was considered a low learner.

Mathematics Achievement Test. The Mathematics Achievement Test (MAT1) was constructed by the researchers. The items were based on the first four topics in the first term of the SS1 syllabus. These topics include indices, logarithm, number system, and modular arithmetic. Out of 80 questions constructed and validated, 40 questions were selected for the study. The items were trial tested on eighty SS1 students from co-educational schools similar to the targeted samples to establish both the difficulty indices and discriminating indices of each item. Forty-one items survived with difficulty indices between 0.40 and 0.60 and discriminating indices of 0.3 and above. Forty questions were used for the study. One item from content (logarithm) with highest number of items was randomly removed under remember (level of cognition), to make the total items 40. The reliability coefficient of 0.83 was determined using Kuder-Richardson (KR-20).

Mathematics Achievement Test 2. Mathematics Achievement Test 2 (MAT2) is the parallel (re-arranged) version of Mathematics Achievement Test 1 (MAT1). At the end of the experiment, the items used for pretest (MAT1) were rearranged and administered as posttest (MAT2). The achievement test was used to assess the performance of the identified low learners at the beginning and the end of the experiment.

Pre-remediation Diagnostic Scale. These items were constructed by the researchers. They were used for the ASP group and made available for control group. The instrument was prepared on the four main topics selected for the experiment: indices, logarithm, number system, and modular arithmetic. These topics are in the first term of SS1 as contained in the ammonized syllabus of Oyo State, Nigeria. The instrument was used as a diagnostic assessment to identify lower level (prerequisite) knowledge that is lacking among the identified low learners. Responses of students to this instrument helped teachers to identify area(s) of need in the identified learners.

Remediation Instrument. The items in this instrument were constructed by the researcher and used to reinforce prerequisite knowledge in the experimental group. The items were constructed by solving the forty questions from the pre-remediation diagnostic scale developed around the four topics (indices, logarithm, number system, and modular arithmetic). Seven prerequisite knowledge concepts to the four topics were identified in the process of solving the forty items. They include (a) directed numbers, (b) simple equations, (c) inverse and identity, (d) large and small numbers, (e) approximation and estimation, (f) decimal and percentages, and (g) factorization of quadratic expressions and equations. The knowledge of these seven topics is required for better understanding of the four topics identified for the experiment. The researcher, therefore, developed items on each of these seven topics. When the teacher identified a lack of knowledge of a basic skill in the process of marking students' work, the remediation instrument was used. This step further helped students to understand the basic skills required to understand the new topics. The two instruments were used for remedial work: the pre-remediation diagnostic scale focused on the main four topics identified, and remediation instrument focused on the prerequisite knowledge needed to understand the identified four topics.

Student Attitude Questionnaire (SQ). This instrument was developed by the researchers to elicit information on students' attitude toward mathematics. The instrument was divided into two sections. Section A included the biographic data of the respondent, while Section B was on the attitude of the student to learn mathematics. Section A was designed to elicit information about the participant's age and sex. Section B was drawn on a four-point Likert-scale response format: very untrue of me–1, not true of me–2, true of me–3, very true of me–4. The response format was reversed for negative items: very true of me–1, true of me–2, not true of me–3, and very untrue of me–4. The content validity was established, and Kuder Richardson (KR-20) formula was used to determine the reliability index of the items which is 0.74.

Treatment Procedure (TP)

Instructional guides were prepared for the research assistants who participated in the study. The guides are divided into experimental and control group procedures.

Instructional Strategy I – Experimental Group Only. The Pre-remediation Diagnostic Scale was administered to the experimental group. The feedback of students' performance in the assessment was presented to them during the following contact. Remediation of the areas noticed followed this format:

a. Teacher gave the feedback;
b. The items were divided into sections;
c. Students with highest scores lead the class;
d. Teacher allowed students to discuss and identify correct answer to each item;
e. Students could ask questions;
f. Students could provide answers to the questions among themselves;
g. Students took turns to lead the other sections;
h. Teacher guided the process and provided assistance, when necessary;
i. The teacher took students through the identified source of the problem, especially in lower level or prerequisite knowledge using the remediation instrument; and
j. The teacher gave more exercises from remediation instrument to ensure better understanding of the prerequisite knowledge.

Experimental Group (ASP). Two schools were used in this group. The research assistant administered the diagnostic assessment to identify areas that required remediation. The feedback of the assessment was presented to the group during the next contact and properly remediated using the treatment procedure outlined above. Lower level knowledge identified was retaught using Remediation Instrument. Additional exercises were given to students in the specific area of need (both as a group and as individuals), which could aid better understanding. See Figure 1 for the procedures used for the after school programme experimental group.

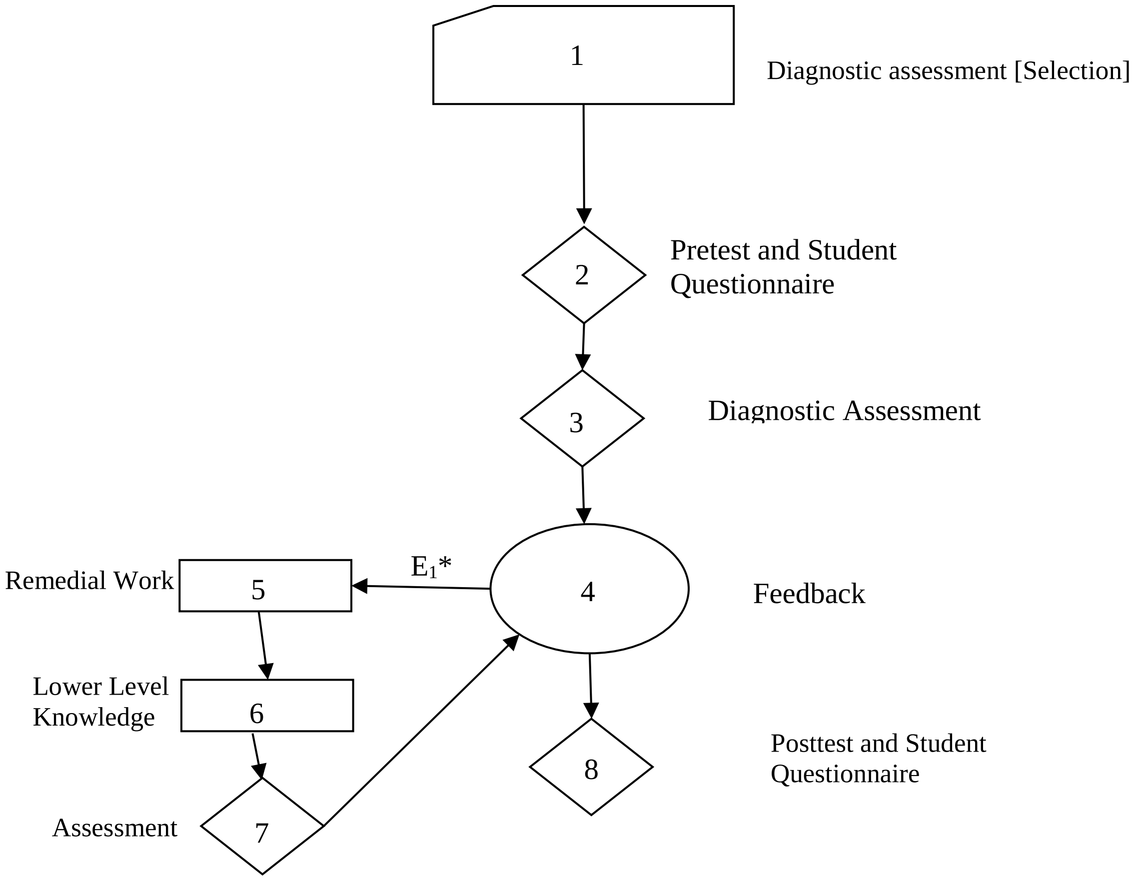

Figure 1. Schematic representation of the experimental (ASP1) procedure adapted from Adeleke (2007). *E_1 – Experimental group followed the pathway that included steps 5-7. Key is as follows:

Instructional Strategy II – Control Group Only. Diagnostic assessment was administered to the participants in control group using the Pre-remediation Diagnostic Scale without feedback or remediation.

Control group. Two schools were used in this group. Students in this group were identified using the diagnostic assessment. Research assistants administered pretest and students' questionnaire to the identified students. Participants in this group were given Pre-remediation diagnostic scale but not provided with the feedback nor remediation. See Figure 2 for the procedures used for the control group.

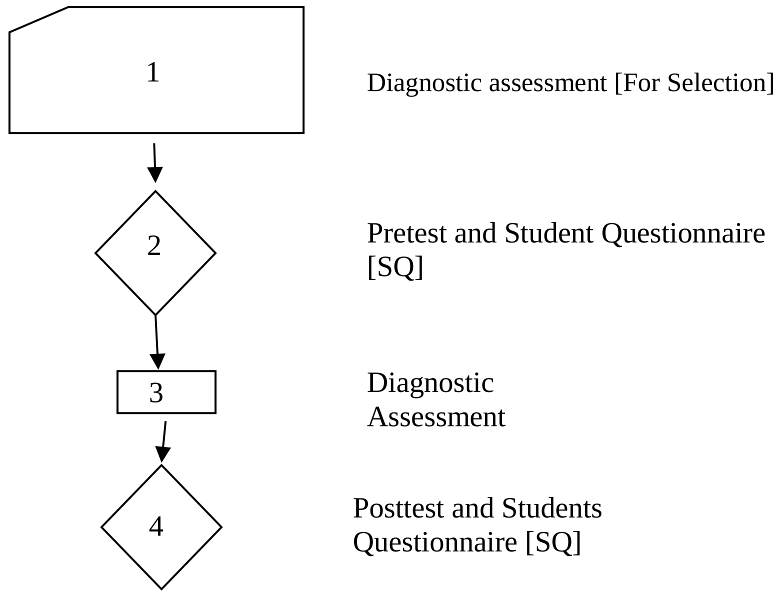

Figure 2. Schematic representation of the control group procedure adapted from Adeleke (2007). The key is the same as the one for Figure 1 with feedback eliminated.

Data Collection

All SS1 (Grade 10) students in the selected schools were given the diagnostic assessment: A mathematics assessment used to select low learners that constituted the participants for the study. MAT1 and SQ were administered to all the selected (low learner) participants as pretest. After treatment, the MAT2 and SQ were administered to all the selected (low learner) participants as post-test. The data generated were subjected to descriptive independent *t*-test.

Results

Table 1 shows no significant difference between the mean attitude of student in the experimental group (M=38.13, SD=8.44) and those in the control group (M=35.81, SD=6.49), $t(93)=1.47$ $p>0.05$. This result means that students' attitudes to mathematics in the two groups were almost the same before treatment.

Table 1
Participants' Attitudes Towards Mathematics Before Treatment

	Treatment	N	Mean	SD	Std. Error	*t*-value	Df	Sig
Pre-Attitude	ASP	53	38.13	8.444	1.160	1.47	93	0.14
	Control	42	35.81	6.493	1.002			

Table 2 shows no significant difference between the mean attitude of students in the experimental group (M=60.72, SD=7.81) and those in the control group (M=60.50, SD=6.41), $t(93)=0.15$ $p>0.05$. This result means that students' attitudes to mathematics in the two groups were almost the same after treatment.

Table 2
Participants' Attitudes Towards Mathematics After Treatment

	Treatment	N	Mean	SD	Std. Error	*t*-value	Df	Sig
Post-Attitude	ASP	53	60.72	7.811	1.073	0.15	93	0.88
	Control	42	60.50	6.417	.990			

Table 3 shows no significant difference between the mean achievement of students in the experimental group (M=10.53, SD=3.11) and those in the control group (M=11.69, SD=3.07), $t(93)=-1.82$ $p>0.05$. This result means that students' achievement in mathematics in the two groups were almost the same before treatment.

Table 3
Participants' Achievement in Mathematics Before Treatment

	Treatment	N	Mean	SD	Std. Error	*t*-value	Df	Sig
Pretest	ASP	53	10.53	3.111	.427	-1.82	93	.072
	Control	42	11.69	3.072	.474			

Table 4 shows a significant difference between the mean achievement of student in the experimental group (M=18.42, SD=3.62) and those in the control group (M=11.71, SD=3.38), $t(93)=9.22$ $p<0.05$. This result implies a significant effect of treatment on students' achievement in mathematics. Therefore, the null hypothesis is rejected.

Table 4
Participants' Achievement in Mathematics After Treatment

	Treatment	N	Mean	SD	Std. Error	*t*-value	Df	Sig
Posttest	ASP	53	18.42	3.624	.498	9.22	93	.000
	Control	42	11.71	3.381	.522			

Discussion

The analysis showed neither initial significant difference before treatment in students' attitudes towards mathematics nor after treatment. Despite the differences among the treatment groups, the main effect was not significant. This finding could be as a result of the time frame for the intervention programme and the peculiarity of the participants (low achievers) as it is generally believed that changing a long time decision, belief, or attitude could be difficult especially for low achieving students who probably have sustained negative attitudes. The finding of this study agreed with a study by Cunningham (2016) who considered an elementary after school enrichment program to improve students' attitudes toward school and found that students' attitudes actually declined between the pre- and post-survey periods. However, through qualitative data analysis, students did hold a positive attitude toward school and found the enrichment experiences enjoyable. Cunningham's finding corroborates the findings of Apara and Yoloye (2014) who found no significant main effect of treatment on students' attitudes towards chemistry. However, these findings were contrary to a study by Obaitan and Adeleke (2007) who found a significant effect of treatment on the attitude of mathematics students.

There was no significant difference in students' achievement in mathematics between the group that benefited from ASP and the comparable group at the start of the experiment. However, by the end of the treatment, the difference in students' achievement between the two groups was significant in the favour of the group who experienced the ASP. Participants in the ASP group had higher mean gain in achievement than those in control group. This result may not be unconnected with the fact that students were made to identify the source of their errors and an appropriate remedy was provided. This finding corroborates the finding of Ofem et al. (2017) that diagnostic assessment, feedback, and directed remediation improve achievement. When students are aware about the source of their errors through diagnostic assessment and appropriate solutions provided, they are better motivated to improve. This result implies that students with adequate knowledge of source of mistake will want to guide against it in the subsequent attempts.

Educational Implications and Recommendations

Based on the findings of the study, the following recommendations are made.

1. After-school programmes should be provided for low-achieving students in mathematics to care for their deficiencies.
2. More teachers should be employed for proper implementation of intervention programmes, such as after-school programmes for low-achieving students.
3. Teachers should be allowed to go for seminars, workshops, and conferences to update their knowledge on adaptation of special instructional interventions like ASP in the classroom.
4. Parents should be encouraged to allow their children to participate in the intervention programmes whenever the school sees the need for it because they usually come up after school hours.

Conclusion

The effectiveness of the ASP with the components such as diagnostic assessment, feedback, and remediation with enhanced prerequisite knowledge could afford low achievers the opportunity to re-build their foundational knowledge in mathematics. It was also discovered that proper identification of low achievers through diagnostic assessment is germane for successful implementation of intervention programmes. Thus, students with special needs should be identified and taught using instructional strategies that will meet their peculiar needs.

References

Adeleke, J. O. (2007). *Effect of cognitive entry characteristics on students' affective outcome in bearing in mathematics*. (Unpublished doctoral thesis). International Centre for Educational Evaluation, University of Ibadan, Ibadan, Nigeria.

Adewale J.G., & Anjorin T. O. (2012). Effects of formative testing on junior secondary school student's achievement in integrated science. In *Strategies across the curriculum-Modern methods of teaching* (pp. 1–15). Ibadan, Nigeria: Powerhouse Press.

Afemikhe, O. A. (1985). *The effect of formative testing on students' achievement in secondary school mathematics*. (Unpublished doctoral thesis). University of Ibadan, Ibadan, Nigeria.

Ajogbeje, O. J. (2012). *Path-analytic model and the effect of some teaching strategies on variables affecting achievement in junior secondary school mathematics in Ondo State.* (Unpublished doctoral thesis). Ekiti State University, Ado–Ekiti, Nigeria.

Ariyo, S. O. (2017). *Diagnostic assessment and effect of after-school programmes on the mathematics learning outcomes of low achieving students in Oyo State secondary schools.* (Unpublished doctoral thesis). University of Ibadan. Ibadan Nigeria.

Apara, O. M., & Yoloye, T. Y. (2014). Effect of problem-solving approaches on senior secondary students. *West African Journal of Education, XXXIV*(11), 118–131.

Bardwell, R. (1981). Feedback: How does it function? *Journal of Experimental Education, 50*(1), 87–95.

Cunningham, M. N. (2016). *The effects of an elementary after-school enrichment program on gifted and talented students' attitudes toward school*. (Unpublished bachelor's honor's thesis). University of Arkansas, Fayetteville, Arkansas, USA.

Dryn, T. (2007). Teachers' concerns on assessment of learners in group work. *Journal of Biological Foundations, 39*(4), 156–162.

Ezeahurukwe, J. N. (2010). *Effects of elaborative interrogation and self-assessment strategies on mathematics achievement, test anxiety and self-efficacy of low achieving students*. (Unpublished doctoral dissertation). University of Nigeria, Nsukka, Nigeria.

Gagné, R. (1971). *Learning hierarchies.* Retrieved from http://iceskatingresources.org/chapter_2.pdf

Gregoire, J. (1997). Diagnostic assessment of learning disabilities: From assessment of performance to assessment of competence. *European Journal of Psychological Assessment, 13*(1), 10–20.

Joshua, M. T., & Ikiroma, B. (2013). Impact of teacher guided assessment among secondary school students in a large class. *Nigerian Journal of Educational Research and Evaluation, 12*(2), 1–8.

Mahoney, J. L., Lord, H., & Carryl, E. (2005). An ecological analysis of after-school program participation and the development of academic performance and motivational attributes for disadvantaged children. *Child Development, 76*(4), 811–825. doi: 10.1111/j.1467-8624.2005.00879.x

Moors, A., Weisenburgh-Snyder, A., & Robbins, J. (2010). Integrating frequency-based mathematics instruction with a multi-level assessment system to enhance response to intervention frameworks. *Behavior Analysis: Research and Practice, 11*(4), 226–244. doi: 10.1037/h0100703

Neuman, S. (2010). Empowered. *Educational Leadership, 67*(7), 30–36.

Obaitan, G.N. & Adeleke J.O. (2007). Effect of cognitive entry characteristics on students' affective outcome in bearing in mathematics. *West Africa Journal of Education, xvii*, 38–53.

Ofem, U. J., Idika, d. O., & Ovat, S. V. (2017). Effect of diagnostic and feedback assessment approaches in enhancing achievement in mathematics among secondary school students in Calabar Municipality. *International Journal of Scientific Research in Education, 10*(2), 221–227.

Shernoff, D. J. (2010). Engagement in after-school programs as a predictor of social competence and academic performance. *American Journal of Community Psychology, 45*, 325–337. doi: 10.1007/s10464-010-9314-0

Shernoff, D. J., & Vandell, D. L. (2007). Engagement in after-school programme activities: Quality of experience from the perspective of participants. *Journal of Youth and Adolescence, 36*, 891–903.

Stecker, P. M., & Fuchs, L. S. (2000). Effecting superior achievement using curriculum-based measurement: The importance of individual progress monitoring. *Learning Disabilities Research and Practice, 15*(3), 128–134.

Suwarto. (2013). Development of diagnostic tests. *Jurnal Pendidikan, 22*(2), 187–202.

Umaru, Y. (2010). *Effects of instructions in metacognitive skills on mathematics self-efficacy belief, interest and achievement of low achieving mathematic students.* (Unpublished doctoral dissertation). University of Nigeria, Nsukka, Nigeria.

Zan, R. A., & Di Martino, P. (2007). Attitudes toward mathematics: Overcoming positive/negative dichotomy. *The Montana Mathematics Enthusiast, Monograph 3*, 157–168.

Authors

Simeon Oluniyi Ariyo, Ph.D., is a mathematics tutor in The International School University of Ibadan, Nigeria. His doctorate is in educational evaluation, and he has master's degrees in educational evaluation and educational management, all from the University of Ibadan. He also holds a first degree in mathematics education from the University of Uyo. His research areas are enhanced teaching and learning, teaching effectiveness and achievement. assessment practices in learning situations, and evaluation of learning outcomes.

Joshua Oluwatoyin Adeleke, Ph.D., is a senior research fellow in the Institute of Education, University of Ibadan, Ibadan, Nigeria. His doctorate in educational evaluation, and he has a master's degree in guidance and counselling (test and measurement) from the University of Ibadan. He also holds a first degree in mathematics education from the University of Ilorin. His areas of interest in research include the use of information and communication technology in learning situation, classroom interaction, assessment practices in learning situations and evaluation of learning outcomes, assessment of issues related to examination conduct and practices, and curriculum implementation process.