Educational Research (ISSN: 2141-5161) Vol. 3(4) pp. 371-379 April 2012
Available online@ http://www.interesjournals.org/ER

Full Length Research Paper

Assessing the effect of prompt feedback as a motivational strategy on students' achievement in secondary school mathematics

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Accepted 20 April, 2012

The purpose of this research work was to assess the effects of prompt feedback as a motivational strategy on students' achievement in secondary school mathematics. The design of this study was a quasi-experimental pretest posttest research design using intact classes. A sample of 300 students randomly selected from five secondary schools in Makurdi and Gwer West Local Government Areas in Benue State was used in this study. The instrument used for data collection was a 30-item cognitive achievement test in mathematics (CATIM) developed by the researcher for the purpose of measuring students' achievement in mathematics. The reliability coefficient for the instrument using Cronbach coefficient alpha was 0.89. In this study, four research questions were answered and four hypotheses were tested. The results indicated that students taught using prompt feedback performed better than those taught without using prompt feedback approach; there was no significant difference in mean performance between boys and girls when they are exposed to feedback. Moreover, students of different age brackets tend to perform creditably when feedback is applied promptly. Location (urban or rural) does not affect the performance of students when they are exposed to prompt feedback. The paper recommends among others that competent mathematics teachers be recruited, remunerated and motivated so as to employ a comprehensive teaching methodology imputed with concrete experiences in order to obviate cognitive dissonance and frustration associated with learning failures in mathematics.

Keywords: Prompt feedback, motivational strategy, student's achievement, secondary school mathematics.

INTRODUCTION

Mathematics is an indispensable tool in societal advancement. In the condition of modern life, a mathematically illiterate person is considered to be circumscribed in playing his full potentials towards the development of his community. Such an individual may be compelled to a marginal existence. He may be so vulnerable to exploitation by others to the extent that he may not be able to achieve his liberation and self-actualization. We are living in the world where mathematics has become an integral part of the world's culture and any nation that overlooks this significant truism does so at its own perils. Kuku (1998) points out that the language of mathematics is virtually spoken in all the disciplines. Mathematics is so acceptable in the world to the extent that its language is universal, all the signs, symbols and formulae are the same anywhere and anytime. Thus the equation 3 + 6 = 9 means the same thing to a Yoruba, Ibo, Hausa, Idoma, or a Tiv man, no matter how he reads it. In mathematics, symbols are used just as figures of speech are used in poetry and literary composition. Observably, even when the same symbols are involved in the writing of the mathematical expression, they may have different meanings; for instance, 4 and x are two symbols but 4x is not the same as 4^x which is different from x^4 which as well is not the same as x^{-4} and it is also quite different from 4^{-x}. Due to these different meanings of the similar symbols with different signs, it is therefore important to understand the

different meanings before attempting computations (Emaikwu, 1996).

Agboola (1996) observes that the study of mathematics is often viewed as the study of abstractions. Many question the rationale behind making it a compulsory subject in the primary and secondary school curricula and vow never to have anything to do with the subject after completing their course of study. There is a notion that mathematics is a difficult, hard, abstract and a complex subject. The causes of poor performance in mathematics are rooted in psychological, physiological or environmental factors. Many persons seem to be confused as to what factors are actually responsible for the falling standard of students' performance in mathematics. This confused state has eventually led many to attribute the fall to: poor condition of service for teachers; lack of qualified teachers; inadequate supply of facilities and equipment; students wrong notion about mathematics; lack of motivation, lack of instructional materials; lack of proper supervision; and wrong method of teaching mathematics (Emaikwu and Nworgu, 2005; Onah, 2012).

It has also been argued that lack of motivation and feedback has accounted for the lion-share of students' poor performance in mathematics. Motivation consists of internal process which spurs somebody to satisfy some needs. It is an internal state that arouses, directs and maintains a behavior (Woolfolk, 2008). All theories in the field of learning either explicitly or by implication, argue that a motivated creature is more likely to learn than the one who is not motivated. Okwubunka (2011) confirms that motivated students work purposely and energetically. She likened the situation to Pavlov who had to starve his dogs and Skinner who had to starve his rats and pigeons in order to motivate them to respond to correct stimulus. She further added that incentives in the form of materials reward, words of praise, encouragement, recognition, immediate knowledge of result are all potent sources of motivation. Rewards she says could act as incentives for further learning. The extent to which a student is motivated determines the energy he puts into the learning process.

Prompt feedback as one of the motivational strategies can be regarded as the information available to the students which makes possible the comparison of their actual performance with some standard performance of a skill at an appointed time without delay. On the other hand, it is the process of informing students, parents and administrators regarding students' progress under shortest possible period. For learners to change their responses they must be furnished with some kind of awareness of their consequences, this process is called "feedback". Beard (2008) says that providing students with feedback on their test scores concerning their performance in periodic test may serve as instructional aid in that knowledge of results facilitate learning. According to him, prompt feedback could facilitate the existence of interaction between the teachers and the students as well as the flow and exchange of information between them. Hull (1952) and Skinner (1957) as cited by Beard (2008) affirmed that knowledge of result acts as reinforcement. However, Annet (2009) thinks that besides acting as reinforcement, prompt feedbacks provide information and if there is greater learning when there is interaction between teachers and students then feedbacks will go a long way to helping students because while giving out the scores, the teacher will also explain the areas where students have difficulties. Pickup and Anthony (2005) see feedback as an essential ingredient by which the teacher can evaluate the success and failure of his teaching. They further stressed that the importance of the employment of feedbacks by the teacher for the achievement of instructional objectives is immense. According to Golmlewski (1999) everyone has a blind spot, and feedback can be used to decrease an individual's blind spot especially in the school subject like mathematics that is obviously seen by many as a very difficult subject to learn.

The effect of feedback on academic performance of students has been investigated by some educationists in foreign countries and whose findings reveal that the availability of feedback creates positive effects on the academic performance of mathematics students. Dyer (2006) found that there is positive effect of feedback on academic performance. Unikel (2007) found no difference in the effect of material reward (example, money) and social reward (example, praise), on the performance of lower class children. However, Havighurst (2004) contends that the performance of lower children should be superior when they are given material rewards. Sessenrath (2005) also concludes from his investigation of what form of feedback is superior to the other, that delayed feedback is superior to immediate feedback. Boonruang (2003) who focused his attention on the group rather than the individual found that feedback increases academic performance of students. He also found out that the group which has positive feedback did better in subsequent test than the controlled group. Santrock and Ross (2001) worked with children and concluded that if children are made to feel inferior to others, their confidence declines and they will not attain effectively as other children who had not been subjected to negative feedback. Their conclusion therefore is that negative feedback has retarding effect on academic performance.

Cob and Hops (2009) found that feedbacks which precede performance in an instructional task have a significant effect on subsequent performances. They concluded that students who performed poorly improve their performance on the receipt of feedback. Sessenrath (2005) found that group to which feedback was given did better than those which had no feedback both in subsequent and transferred tests. Leith (2006) concluded that student teachers who were assessed and their performance reported to them did better in subsequent

teaching. Overall and Marsh (1999) in their investigation into the effect of feedback on teachers' performance and subsequent effect on students, found that the teachers as well as the students performed better than their earlier respective performances.

On the influence of feedback on students of different sexes, Deci (2004) discovered that except for female students all male students who received active feedback showed increase in their intrinsic motivation in later instructional task than their counterparts who received no feedback. The important thing here therefore is that there is a sex difference in response to positive feedback in achievement related situation. The study also showed that females who receive no feedback exhibited more intrinsic motivation than their counterparts although this was not quite significant. Orji (1999) found out that older boys and girls achieve higher when given non-material reward. He also belief that boys perform better than girls when treated with material reward whereas younger girls when treated with older boys show no sex difference from girls when materials reward is used for treatment. The result also noted some high performance of child in the groups that received no rewards or feedback, a situation which suggests the influence of some other factors on the children outside feedback. Prompt feedback contributes in no small measure to the academic performance of students in mathematics despite other difficulties.

Experiment has proved that reinforcement is important in learning. From Thorndike law of effect positive feedback results in positive impact while on the other hand negative feedback results in negative impact. The stimulus response association theory of learning summarizes Skinner's, Pavlov's, Thorndike's, and Hull's theories of learning that learning takes place through the establishment or strengthening of bonds between the stimulating conditions and the responses. But for this, to happen, the stimulus, the response and the reinforcement must take place simultaneously. Tony (2012) reported that learning environment might be one of the important factors in promoting and understanding of mathematics concepts at secondary school level. He affirms that the richer the environment, the more efficient the learning and that better learning environments are provided in urban schools than in rural schools. To Arem (2011), school location (urban or rural) does not play any significant role in students' mathematics achievement when he reported that for a student to achieve academic success, it is more than innate ability, competence or the desire to learn. The key element in this process according to him is having a positive attitude. He reaffirms that a positive attitude becomes the catalyst, the super charger that propels students along the road towards reaching mathematics proficiency and not necessarily the school location.

The effect of a positive feedback or negative feedback on students which are of course multiple in outlooks can make or mar a student's educational aspiration. It is evident that majority of the students in Nigeria perform very poorly in senior secondary mathematics examination and one of the reasons identified is lack of prompt feedback (Emaikwu and Nworgu, 2005; Arem, 2011; Onah, 2012). Much is yet to be known about the effects of various forms of feedbacks on students' academic performance in Nigeria. It is against this background that this study is undertaken to assess the effects of prompt feedback as one of the motivational strategies in secondary school mathematics achievement.

Research questions

To carry out the study the following research questions were posed:

1. What is the mean score of students who are exposed to prompt feedback and those who are not exposed to it?
2. To what extent would the sex of students influence their academic performance when prompt feedback is used as motivational strategy?
3. What is the mathematics mean achievement scores of urban and rural students who are exposed to prompt feedback?
4. To what extent would the age of students influence their academic performance when prompt feedback is used as a motivational strategy?

Research hypotheses

The following hypotheses are formulated and tested at 5% level of significance:

1. There is no significant difference between the mean scores of students who are exposed to feedback and those who are not exposed to it.
2. There is no significant difference in the mean achievement scores of students in mathematics between boys and girls who are exposed to prompt feedback.
3. There is no significant difference in mathematics achievement between the urban and rural students who are exposed to prompt feedback.
4. There is no significant difference between the ages of students and their academic performance when prompt feedback is used as a motivational strategy.

RESEARCH METHODOLOGY

The design of this study was a quasi-experimental research design. Precisely a pre-test and posttest intact control group design was used. To apply this design, the researcher gave the pretest to the experimental and control groups to determine their initial equivalence in all relevant aspects before their exposure to the treatment variables. Subsequently, the experimental group received

prompt feedback as a motivational strategy while the control group did not receive prompt feedback. At the end of the experimental exercise, the experimental group and the control group were administered the items of cognitive achievement test in mathematics (CATIM) to determine the treatment effect. Besides teaching the two groups involved, the teachers collected the experimental group's scores and discussed their performances and thereafter gave them the scripts and encouraged them to work harder. This discussion took place on three occasions, but the control group was denied this opportunity. The study was carried out in Makurdi metropolis and Gwer West Local Government Area of Benue State. The justification for the choice of this area of study in the first instance was in relation to reflect urban and rural schools. In addition, the choice of this area of study was as a result of its geographical proximity to the researcher who resides in Makurdi. The population of this study comprised all the 2009/2010 students in SSS11, studying mathematics in the mixed secondary schools in the study area. A total of 2250 candidates formed the population for the study. The researcher obtained the information about the population of this study from the statistics section of the post primary education zonal office in Makurdi. The participants were considered for the study on the ground that they have studied mathematics for at least five years and have almost covered the West African senior school certificate examination syllabus for mathematics.

The sample for this study consisted of 300 senior secondary school students in five randomly selected secondary schools within the study area using simple random sampling technique. The sample for this study was made up of 150 male and 150 female students. 60 students were randomly selected from each of the five secondary schools that formed the sample for this study. All the sampled schools have presented students for senior secondary school certificate examination for at least 10 years. The approach used in the selection of the sample for this study was such that every element of the target population had equal and independent chance of being included in the sample for the study. The experimental and control classes were separated to make sure that students in one class were not aware of what happened in the other class. The age range of students was between sixteen and twenty-three years. The instrument used for data collection was a multiple-choice test consisting of a 30- item cognitive achievement test in mathematics (CATIM) developed by the researcher and with its items selected from trigonometry and algebra. Each item of the instrument has five options lettered A-E with a pseudo-chance parameter of 0.20 probability of success for low ability students. Three mathematics educators validated the items of the instruments. Each of them was asked to judge the adequacy of items of the instruments. The specialists were required to say if the items on the test afford a ready and adequate means of determining the extent to which the objectives are realizable. They were asked to assess the brevity of the items. The experts in mathematics were asked to solve the items of the test and then to indicate the correct options. Their various answers were compared and noted. Based on their comments, some items were reviewed. The items generally assessed as adequate were included in the final versions of instruments and those ones regarded as inadequate were removed. The comments given were strictly adhered to and appropriate corrections effected.

The reliability coefficient of the instrument for this study was determined by the scores obtained from a pilot study using Cronbach alpha coefficient. The reliability coefficient for the cognitive achievement test items in mathematics (CATIM) was 0.89. This proves that the instrument was reliable. The researcher administered a pretest on the experimental and control groups to determine their initial equivalence. Subsequently, the experimental group was taught and prompt feedback about their performance was given to them while the control group did not receive any prompt feedback. In each sampled school, the same teacher taught both the control group and the experimental group to control teacher effect. At the end of the experimental exercise, the experimental group and the control group were administered the items of cognitive achievement test in mathematics (CATIM). Scores were thereafter assigned to the responses of the students in the experimental and control groups to determine the treatment effect. The marking scheme was prepared by the researcher while the subject teacher did the scoring. He also gave feedback to the experimental group while the control group was denied feedback. The data collected from the subjects were analyzed according to research questions and the research hypotheses. Descriptive statistics such as the mean, variance and standard deviation were used to answer research questions while t-test statistic was used to test the hypotheses at 5% level of significance. The corresponding research questions were matched with the corresponding hypotheses and handled using one table for economy of space.

DATA ANALYSIS AND RESULTS

Research questions 1

What is the mean score of students who are exposed to feedback and those who are not exposed to it?

Null hypotheses 1

There is no significant difference between the mean score of students who are exposed to feedback and those who are not exposed to it.

Table 1 shows the mean, variance and standard devi-

Table 1. Mean, variance and standard deviation of posttest achievement scores of experimental and control groups as well as two-tailed t-test of difference between means of students who are exposed to feedback and those who are not exposed to feedback

Groups	Mean	Variance	SD	N	df	α	t-cal	t-critical
Experimental group	61.2	15.8	3.97	150				
Control group	59.3	19.2	4.38	150	298	0.05	3.93	1.96

Table 2. Mean, variance and standard deviation of male and female students of the experimental group as well as their corresponding two-tailed t-test of difference between means

Groups	Mean	Variance	SD	N	df	α	t-cal	t- critical
Male	61.8	14.8	3.847	90				
Female	60.6	16.9	4.11	60	148	0.05	1.796	1.96

ation of the experimental and control groups as well as the corresponding hypothesis tested using t-test statistic

Table 1 above shows that the mean score (61.2) of the experimental group taught using prompt feedback as a motivational strategy is higher than that of the control group (59.3) who were not exposed to prompt feedback. The result of the hypothesis indicated that the t - calculated value (3.93) exceeded that of t–critical value (1.96); therefore the null hypothesis is rejected. This implies that the effect of prompt feedback as a motivational strategy on student's achievement in mathematics is significant at 5% level of significance. The result shows that the use of prompt feedback as a motivational strategy has higher effect on student's achievement than when prompt feedback as a motivational strategy is not used. There is the need to calculate the effect size for this independent sample t-test statistics which yielded a statistical significant result. Effect size statistics provide an indication of the magnitude of the differences between the two groups being statistically compared. The procedure for calculating *eta* squared for the independent t-test statistics in table 1 above is provided by the formula:

$$\text{eta squared} = \frac{t^2}{t^2 + (n_1 + n_2 - 2)}$$ From Table 1,

the t-calculated is 3.93, n_1=150 and n_2=150, the eta squared could be calculated by replacing the values in the formula.

Hence the

$$\text{eta squared} = \frac{t^2}{t^2 + (n_1 + n_2 - 2)} = \frac{(3.93)^2}{(3.93)^2 + (150+150-2)} = 0.049274 \approx 0.0492$$

The guidelines for interpreting the value of *eta* squared are: 0.01 = small effect, 0.06 = moderate effect, 0.14=large effect. In this hypothesis, we can see that the effect size of 0.0492 is a small effect size. Expressed as a percentage, (i.e. multiply the effect size by 100), 4.92 per cent of the variance in the dependent variable could be explained by the independent variable of prompt feedback as a motivational strategy.

Research question 2

To what extent would the sex of the students influence their academic performance when prompt feedback is used as motivational strategy?

Null hypothesis 2

There is no significant difference in the mean achievement scores in mathematics between boys and girls who are exposed to prompt feedback. The table 2 shows the mean, variance and standard deviation of both male and female students of the experimental group as well as the corresponding hypothesis tested using t-test statistic.

Table 2 above shows the mean score (61.8) of male and that of the female (60.6); the result of the corresponding hypothesis shows that the t-calculated value of 1.796 lies within the boundary of the normal curve with t-critical value of 1.96; therefore, the null hypothesis is accepted. This implies that there is no significant difference in the mean score of academic achievement in mathematics between male and female students when prompt feedback is used as motivational strategy. Therefore boys and girls do not differ significantly in their performance in mathematics when they are exposed to feedback. Any physical differences observed between the mean of male and female students are such that might have arisen from sampling errors or any other variations in the experiment. Even though the

Table 3. Mean, variance and standard deviation of urban and rural students of the experimental group as well as their corresponding two-tailed t-test of difference between means

Groups	Mean	Variance	SD	N	df	α	t-cal	t-crit
Urban	61.4	18.7	4.324	80				
Rural	61.0	16.1	4.012	70	148	0.05	0.587	1.96

Table 4. Mean, variance and standard deviation of students within the age range of 16-19 years and those within the age range of 20-23 years of the experimental group as well as their corresponding two-tailed t-test of difference between means

Groups	Mean	Variance	SD	N	df	α	t-cal	t-critical
Age 16-19	61.7	19.2	4.38	84				
Age 20-23	60.7	18.5	4.30	66	148	0.05	1.401	1.96

result of the t-calculated was not significant, we could again calculate the eta square from the values in Table 2 to indicate the strength of the relationship between the dependent variable and independent variable. The effect size as indicated from the calculated eta squared is

$$\frac{t^2}{t^2+(n_1+n_2-2)}=\frac{(1.796)^2}{(1.796)^2+(90+60-2)}=\frac{3.225616}{151.225616}=0.0213298254\approx 0.0213$$

In this hypothesis, we can see that the value of eta square of 0.0213 is a small effect size. Expressed as a percentage, (i.e. multiply the effect size by 100), only 2.13 per cent of the variance in the male category could be explained by the female category when prompt feedback as a motivational strategy is used.

Research question 3

What is the mathematics mean achievement scores of urban and rural students who are exposed to prompt feedback?

Research hypotheses 3

There is no significant difference between the mean score of urban and rural students who are exposed to feedback.

The table 3 shows the mean, variance and standard deviation of both urban and rural students of the experimental group as well as the corresponding hypothesis tested using t-test statistic.

Table 3 above shows the mean score (61.4) of urban students and that of the rural (60.0); the result of the corresponding hypothesis shows that the t-calculated value of 0.587 is less than the t-critical value of 1.96; therefore, the null hypothesis is accepted. This implies that there is no significant difference in the mean score of academic achievement in mathematics between urban and rural students when prompt feedback is used as motivational strategy. Therefore location (urban or rural) does not create any difference in the performance of students when they are taught and exposed to prompt feedbacks. Any physical differences observed between the mean of urban and rural students are such that might have arisen from sampling errors or any other variations in the experiment. Even though the result of the t-calculated was not significant, we could again calculate the eta square from the values in table 3 to indicate the strength of the relationship between the dependent variable and independent variable. The effect size as indicated from the calculated eta squared is

$$\frac{t^2}{t^2+(n_1+n_2-2)}=\frac{(0.587)^2}{(0.587)^2+(80+70-2)}=\frac{0.344569}{148.344569}=0.002322761386\approx 0.00232$$

In this hypothesis, we can see that the value of eta square of 0.00232 is a very small effect size. Expressed as a percentage, (i.e. multiply the effect size by 100), only 0.23 per cent of the variance in the urban category could be explained by the rural category when prompt feedback as a motivational strategy is used.

Research question 4

To what extent would the age of students influence their academic performance when prompt feedback is used as a motivational strategy?

Hypothesis 4

There is no significant difference between the ages of students and their academic performance when prompt feedback is used as a motivational strategy.

In order to answer this research question and to test the hypothesis, students' age range of 16-19 were considered as group one and those within the range of 20-23 were considered as group two. All the two groups were of the experimental category. The table 4 shows the

mean, variance and standard deviation of students within the age range of 16-19 years old and those within the range of 20-23 years of the experimental group as well as the corresponding hypothesis tested using t-test statistic.

Since the calculated t-value of 1.401 is less than the t-critical value of 1.96, the null hypothesis is therefore accepted. The inference is that there is no significant age difference on the effects of feedback on students' academic performance as measured by their mean scores between students of age brackets of 16-19 years old and 20-22 years old. Therefore students of the two age brackets perform equally well when exposed to prompt feedback as motivational strategy.

DISCUSSION OF FINDINGS

The results of this study indicated that instructional technique via prompt feedback generally improves students' achievement in mathematics. This may be because prompt feedback influences the readiness, interest and attention of students in the class thereby making them achieve better performance than when feedback is not given. This finding resonates or is in conformity with the findings of Sessenrath (2005) who found that group to which feedback was given did better than those which had no feedback both in subsequent and transferred tests. This result agrees with Beard (2008) who equally says that providing students with feedback on their test scores concerning their performance in periodic test may serve as instructional aid in that knowledge of results facilitate learning. According to him, prompt feedback could facilitate the existence of interaction between the teachers and the students as well as the flow and exchange of information between them. Beard (2008) further affirmed that knowledge of result acts as reinforcement. Booruang (2003) also found that group which received positive feedback did better in the subsequent test than their counterparts who did not receive feedback in the control group. This result deviates markedly from Santrock and Ross (2001) who reported that if children are made to feel inferior to others during feedback report, their confidence declines and they will not attain effectively as other children who had not been subjected to negative feedback. Their conclusion therefore is that negative feedback has retarding effect on academic performance. Nevertheless Golmlewski (1999) reported that everyone has a blind spot, and feedback can be used to decrease an individual's blind spot especially in the school subject like mathematics that is obviously seen by many as a very difficult subject to learn. Lack of feedback contributes immensely to the poor performance of students in senior secondary school mathematics. If feedback is employed appropriately it will bridge the gap between students and teachers thereby obliterating the phobia that students have for mathematics. It is therefore expedient on the part of teachers to discover the best ways of motivating children so that they could learn effectively in schools.

The result of this study shows that there is no significant difference in the mean achievement scores of students in mathematics between boys and girls who are exposed to prompt feedback. This result deviates radically from Deci (2004) who discovered that except for female students all male students who received active feedback showed increase in their intrinsic motivation in later instructional task than their counterparts who received no feedback. The important thing in his study was that there was a sex difference in response to positive feedback in achievement related situation. The study also showed that females who receive no feedback exhibited more intrinsic motivation than their counterparts although this was not quite significant. Orji (1999) found out that older boys and girls achieve higher when given non-material reward. He also belief that boys perform better than girls when treated with material reward whereas younger girls when treated with older boys show no sex difference from girls when materials reward is used for treatment. Prompt feedback contributes in no small measure to the academic performance of students in mathematics despite other difficulties.

One of the research hypotheses was designed to find out whether there exists any significant difference in performance between urban and rural based students who are exposed to feedback. After testing, it was discovered from the calculated t-value that there is no significant difference between the performances of the two groups. This means that location has no significant influence on the performance of students when exposed to prompt feedback. This contradicts the findings of Tony (2012) who reported that learning environment might be one of the important factors in promoting and understanding mathematics at secondary school level. He affirms that the richer the environment, the more efficient the learning and that better learning environments are provided in urban schools than in rural schools. To Arem (2011), school location (urban or rural) does not play any significant role in students' mathematics achievement when he reported that for a student to achieve academic success, it is more than innate ability, competence or the desire to learn. The key element in this process according to him is having a positive attitude. He reaffirms that a positive attitude becomes the catalyst, the super charger that propels students along the road towards reaching mathematics proficiency and not necessarily the school location.

One hypothesis was meant to find out the effect of feedback on age. Ages 16-19 and 20-23 were used. The findings showed that there is no difference between students of age bracket 16-19 and bracket 20-22 when feedback strategy is applied to them. This result partly agrees with Unikel (2007) who found no difference in the effect of material reward (example, money) and social

reward (example, praise), on the performance of lower class children. However, Havighurst (2004) contends that the performance of lower children should be superior when they are given material rewards. Therefore age has no effect on the efficiency or otherwise of prompt feedback when used as a motivational strategy in instructional delivery. Feedback is not age selective hence students of varying age brackets tend to perform creditably when feedback is applied in instructional delivery.

CONCLUSION

Based on the results of this study, the following conclusions could be drawn:

Prompt feedback has been identified as a better strategy for the teaching and learning of mathematics. This is because feedback influences the attention of students thereby making them to achieve better performance than their counterparts in the control group.

It has been established that difference does not exist between male and female students when they are exposed to feedback. This indicates that sex of student is not a barrier to better performances provided by feedback as a motivational strategy.

Students of different age brackets tend to perform creditably when prompt feedback is used. The fact that students' age levels differ does not affect their performance provided both groups are treated the same, that is, both are exposed to feedback.

Moreover, the result shows that location does not affect the performance of students when they are exposed to feedback. This means that whether students are from urban or rural location has no influence on their performance provided both locations have equal treatment in terms of feedback. This implies that rural students could equally perform the same way as their urban counterparts when exposed to feedback.

RECOMMENDATIONS

Based on the results of these findings, the following recommendations are made:

1. Since prompt feedback improves students' achievement in learning mathematics, teachers should incorporate this approach in their instructional delivery. Moreover, School administration, government and cooperate bodies should support the use of prompt feedback in the teaching mathematics due to its potentials in facilitating learning.
2. Prompt feedback strategy should always be used to arouse, sustain and maintain interest of students in mathematics so as to bridge the gap between students and teachers with a view to annihilating the phobia that students have for mathematics.
3. Mathematics teachers should up-date their teaching methodologies through the use of prompt feedback as this will go a long way to improving mathematics education in Nigeria.
4. The mathematics teachers should be enlightened on the effective use of feedback. Workshops and seminars should be organized to acquaint teachers with the modern application of feedback.
5. Parents and guardians should always seek to know from their wards about the daily work done in schools so as to find the performance of their wards. Curriculum planners should plan mathematics curriculum in such a way that extra time is given for mathematics lessons so that there will be enough time for making use of prompt feedback in the class.
6. Above all, competent mathematics teachers should be adequately recruited, remunerated and motivated so as to employ a comprehensive teaching methodology imputed with concrete experiences in order to obviate cognitive dissonance and frustration associated with learning failures in mathematics.

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