World Journal of Research and Review (WJRR)
ISSN:2455-3956, Volume-6, Issue-6, June 2018 Pages 22-28

Effect of Mastery Learning Strategy on Rural and Urban Students' Academic Achievement in Basic Technology in Edo State, Nigeria

Dr. ISERAMEIYA Florence Ejodamen, Prof. Uwameiye Raymond

***Abstract*— This study determined the effect of mastery learning strategy on rural and urban students in basic technology in Edo State Nigeria. The study was guided by five research questions based the specific purposes. Four null hypotheses formulated were tested at 0.05 level of significance. Quasi-experimental design was adopted in the study, a population of 3,170 (1,275 rural & 1,895 urban) JSSII students from 25 secondary schools were used. A sample size of 155(72 rural & 83 urban) students from four selected means schools participated in the study. The instrument was a 50 item multiple choice basic technology achievement test (BTEAT). Data collected were analyzed with descriptive and inferential statistics, which is Mean, t-test and Analysis of Covariance (ANCOVA). Results revealed that the post-test academic achievement of rural and urban students taught BTE using MLS differs significantly over those taught using direct instruction strategy (DIS). There was a significant difference between the post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with MLS, the rural students performed relatively higher than the urban students. In addition, students' school location and instructional strategy (MLS) have significant interaction effects on academic achievement in Basic Technology (BTE). Therefore, the integration and use of MLS in teaching and learning BTE is recommended.**

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas.**

I. INTRODUCTION

Technology is a vital key to national development, it plays key role in adjusting to rapid technological changes. Technology is a vital instrument for economic, social and political development. Any nation that lack solid foundation in technology in this era of digital world will likely not stand. Nation capacity and ability to transform her natural God given resources to physical practical reality, tells her economic position in the global world. Technology is regarded as a vehicle for economic and social development in any country (Ajagun, 2006). The arm of technology that initiates and gives general orientation to children is called basic technology.

Dr. ISERAMEIYA Florence Ejodamen, Faculty of Education, Department of Vocational and Technical Education, Ambrose Alli University, Ekpoma Edo State Nigeria

Prof. Uwameiye Raymond, Faculty of Education, Department of Vocational and Technical Education, Ambrose Alli University, Ekpoma Edo State Nigeria

Basic technology is the bed rock of technology, designed to ensure that the students are properly taught the basic skills and fundamentals in science and technology that will enable them learn effectively within the global community. Basic technology is that aspect of technology that exposes students to various fields in technology through exploration thereby helping them to develop positive interest for future career choice in technology. According to Mankilikl and Dawal, (2015) basic technology is an instrument for economic and technology development. It provides basic technological literacy for everyday living and as well stimulates creativity amongst learners. Furthermore, basic technology is designed towards helping to develop students' interest in learning science and technology in the secondary school and beyond, thereby producing scientists and technologist for the nation (Okwor, 2011). Basic technology is offered at the junior secondary school, an arm of secondary education designed to lay solid foundation for further study. Secondary school students' vary in their learning styles and thus defers in their levels of academic achievement.

Academic achievement is a very strong factor that indicates the extent to which set goals has been achieved in any educational system. In other words it tells how well the learners in particular and the school system in general have progressed in accomplishing set goals. Academic achievement is the level of attainment, the manifestation of what have been learnt. According to (Owoeye & Yara 2011; Wambugu, 2006) school location and teaching approach that a teacher adopts are determining factors that may affect students' motivation and academic achievement. School environment affects academic achievement of students. Childs immediate environment home or school type, rural or urban, plays vital role in their academic achievement.

Observably, variations exist in academic achievement amongst rural and urban students. Igboegwu and Okonkwo (2012) study indicates a significant difference in students achievement with respect to location of school and education zones. The study showed that students in urban schools achieved significantly better than students in the rural schools. Similarly, Alordiah, Akpadaka, and Oviogbodu (2015), study showed that there was significant difference between the performances of urban students and rural

students. The urban students performed higher than the rural students. The urban students performance may have be influence by other factor like teachers' qualification, availability of instructional materials, well equipped laboratory and workshops amongst others than the rural students as a result of teachers not wanting to go to rural schools to teach, students spend so much time on farm work at the expense of the time they should spend on their study.

Historically, people think of rural schools as being detrimental to student achievement, however, (Kissau 2006; Mitee, & Obaitan, 2015) studies rural schools have proven to be advantageous for several reasons. Firstly, there are fewer students in rural schools; their funding does not have to be comparable to schools with thousands of students. Secondly rural schools tend to have low student/teacher ratios, which allows for more individualized attention and assistance in areas of student difficulty. Thirdly, rural schools are inclined to using group learning strategy. This strategy allows the students to work with one another and benefit from group discussions and various opinions. Furthermore, many rural schools have strong ties with their community, consequently students feel comfortable in their school, and are at their maximum potential for learning. Unlike urban and inner-city schools, rural schools are very safe. Lastly, rural schools have higher graduation rates and fewer discipline problems than urban schools.

In addition, difficulties with rural schools are that they vary greatly by geographic location, economy, and resources. In rural areas where both the schools and students have access to high quality instruction, safe atmosphere, and communal support, academic achievement tends to be higher than in states where the students do not have access to these crucial resources (Alordiah, Akpadaka & Oviogbodu, 2015). According to Mankilikl and Dawal (2015), MLS is an effective teaching and learning strategy designed to advance an individual's potential for learning, all students are expected to master the learning objectives in a unit before proceeding to the next unit. Mastery learning Strategy is an alternative method of teaching and learning for many students who do not respond well to direct instructional strategy. According to Udo and Udofia (2014), mastery learning is an innovation which in its various forms is designed towards making learners perform beautifully well in academic task. MLS is designed to have all students learn instructional material at roughly equivalent, high levels.

According to Ajogbeje (2012), in MLS uniform instruction is presented in the classroom, the same instruction is presented to a number of students and achievement is measured in terms of how much information students are able to master. Unlike summative assessments, which are used solely for the purpose of ranking students, the assessments administered in MLS are diagnostic and prescriptive. Students receive feedback on their mistakes and they are paired with specific correctives to address errors. Enrichments are provided for stronger students, who manage to score above the mastery criterion on their first attempt, so as to enhance their learning.

II. Statement of the Problem

School location and instructional strategy are vital factors that affect the academic achievement of students. Social interactions with once environment have great impact on learning and academic achievement, thus, studies on these factors are timeless classic. Uniqueness of basic technology to national development, demand that a solid foundation be laid at the basic level, to actualize this, use of appropriate teaching strategy and conducive learning environment is unquestionable. According to Oludipe (2012), academic achievements of students respond to immediate environmental factors like school types and parental involvement in their academic activities. Parents' standard of living helps in sending their children to good schools with quality infrastructures, instructional materials, counseling and guidance service and learning environment that improved students' academic achievements.

Good enough in recent times, there are many innovative teaching strategies like mastery learning strategy that have proved helpful in enhancing students academic achievement irrespective of the school location. Nations like, Japan, China, Indian Indonesia amongst others worldwide are noting good report with the use of mastery learning, it therefore, become imperative to examine its effect on rural and urban students academic achievement in basic technology in Edo State, Nigeria.

III. Purpose of the Study

The purpose of this study was to determine the effect of mastery learning strategy on academic achievement of rural and urban students in Basic Technology in Edo State. Specifically, the study determined;

1. The pre-test and post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) using Direct Instruction Strategy (DIS) and those taught using Mastery Learning Strategy (MLS)
2. The difference in the post-test academic achievement mean score of rural students taught BTE using DIS and those taught with MLS.
3. The difference in the post-test academic achievement mean scores of urban students taught BTE with MLS and those taught with DIS.
4. The difference in the post-test academic achievement mean scores of rural and urban students taught BTE with MLS.
5. The interaction effect of students' school location and instructional strategy (MLS) on academic achievement in BTE.

A. Significance of the Study

Findings of this study would benefit Basic Technology teachers, students, and government and future researchers.

The findings of this study when implemented would be used to guide teachers on the need help all student learn BTE well with MLS. When teachers use MLS immediate feedback and formative assessments components, they would experience the joy of job satisfaction they long for.

The findings of this study if put to practice in schools would help students in developing their interest towards technology, have detailed prescription of what more is needed to master learning objectives. It would minimized there learning difficulties in BTE

To the government the findings would positively influence students' attitude towards technology and learning generally. Consequently the aim and objective of including BTE into the school curriculum would be actualized. Finally, findings of this study would also provide relevant literature for related studies.

B. Scope of the Study

This study was delimited to the effect of mastery learning strategy on academic achievement of rural and urban Basic Technology students in Edo State. The study also determined the interaction effects of school location and instructional strategy (MLS) on students' academic achievement in BTE.

C. Research Questions

The following research questions guided the study:

1. What are the pre-test and post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with Direct Instruction Strategy (DIS)?
2 What are the pre-test and post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with Mastery Learning Strategy (MLS)?
3. What are the differences between post-test academic achievements mean scores of rural students taught BTE with MLS and those taught with DIS?
4. What is the difference between the post-test academic achievement mean scores of urban students taught BTE with MLS and those taught with DIS?
5. What is the difference between the post-test academic achievement mean scores of rural and urban students taught BTE with MLS?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. There is no significant difference between the post-test academic achievements mean scores of rural students taught BTE with Direct Instruction Strategy and those taught with MLS
2 There is no significant difference between the post-test academic achievement mean scores of urban students taught BTE with MLS and those taught with DIS.
3. There is no significant difference between the post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with MLS.
4. Students' school location and instructional strategy (MLS) do not have significant interaction effects on academic achievement in BTE

Methods

D. Research Design

This research study adopted Quasi-Experimental design.

E. Area of the Study

Edo Central was used for this study. Edo Central is made up of 5 local government areas, namely; Esan Central, Esan North East, Esan South East, Esan West and Igueben.

F. Population for the Study

The population for the study was 3,170 (1,275 rural & 1,895 urban) JSS II students from 25 public junior secondary schools offering Basic Technology in their curriculum in Edo Central in the 2015/2016 academic session.

G. Sample and Sampling Techniques

Sample size for the study was 155 (72 rural & 83 urban) JSS11 students from four mixed schools (two schools each from rural and urban areas). A simple random technique was used to select which schools will be experimental or control groups. Since school authority would not allow reconstitution of classes for experiment, intact classes were used. In order not to disrupt normal school programme during the experiment the respective class teachers were used.

H. Instrument for Data Collection

Instrument for data collection was a 50-item Basic Technology Achievement Test (BTEAT). The instrument was a multiple choice objective test and the items covered selected topics and components of the subject. The Basic Technology Achievement Test (BTEAT) was used for both the pre-test and post-test except that the items were reshuffled before it was administered as post- test.

I. Validation of the Instrument

The instrument was subjected to face and content validation. It was given to four experts in technology education who carefully scrutinized the items ascertained its validity.

J. Reliability of the Instrument

Test–retest method was used to establish the reliability of the instrument. it was administered to pilot school (trial group of an intact class of 40 students) in another local government area in Edo State. Pearson product moment correlation coefficient was used to correlate the two results and a reliability co-efficient index of 0.85 was obtained. This high correlation index indicates that the instrument was reliable for the study. In accordance with Uzoagulu (2011), 0.7 or above is an acceptable reliability value.

Table Presentation and Analysis of Data

Data collected based on the research questions raised and hypotheses formulated are presented as follows:

Research Question1: What are the pre-test and post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with Direct Instruction Strategy (DIS)?

Table 1: Pre-test Post-test Academic Achievements Mean Scores for Rural Students Taught Basic Technology Using MLS and that of those Taught with DIS

Location (Rural)	N	Pre-Test mean	SD	Post-Test mean	SD	Post test Mean score diff.
Exptal. Group	38	46.65	11.78	68.12	9.9	15.15
Control Group	34	50.03	10.33	52.97	7.28	

Table 1 showed the academic achievements mean scores of rural school students taught BTE using MLS and those taught with DIS. The results showed that students taught with MLS, performed higher in their post-test academic achievement mean score compared to those taught using DIS, with a mean score difference of 15.15

Research question 2: What are the Academic Achievements Mean Scores of Urban Students who were Taught Basic Technology (BTE) Using MLS and those taught with DIS?

Table 2: Academic Achievements Mean Scores for Urban Students Taught Basic Technology (BTE) with MLS and those Taught with DIS

Location (Urban)	N	Pre-Test mean	SD	Post-Test mean	SD	Post test Mean score diff.
Exp.Group	43	55.84	8.67	63.96	9.26	13.43
Control group	40	49.33	9.99	50.53	10.23	

Data in Table 2 showed the pretest/posttest academic achievements mean scores of urban school students taught BTE using MLS and those taught with DIS. The results showed that students taught with MLS, performed higher in their post-test academic achievement mean score compared to those taught using DIS, with a mean score difference of 13.43

Research question 3

What are the post-test academic achievements mean scores of rural and urban students who were taught basic technology with MLS?

The data related to this research question are presented in Table 3.

Table 3 Pre-test/Post-test Academic Achievements Mean Scores for Rural and Urban Students Taught Basic Technology (BTE) with MLS

Location	N	Pre-Test mean	SD	Post-Test mean	SD	Post test Mean score diff.
Rural	38	46.65	11.87	68.12	9.90	4.16
Urban	43	55.84	8.67	63.96	10.23	

Data in Table3 showed pre-test / post-test mean scores of rural and urban students taught BTE using MLS were 68.12 and 63.96, and the academic achievements mean score difference was 4.16, in favour of rural students. Meaning rural school students performed relatively higher than the urban students. The standard deviation revealed the level of dispersion of the individual scores in the distributions from the mean score.

IV. Statistical Results of Test of Null Hypotheses

The four null hypotheses formulated were tested in this section. The t-test statistic was used for analyzing data relating to hypotheses 1-3, while Analysis of Covariance statistic was used for analyzing data relating to hypothesis 4 and all the four hypotheses were tested at 0.05 level of significance.

Ho_1:

There is no significant difference between the post-test academic achievements mean scores of rural students taught BTE with Direct Instruction Strategy and those taught with MLS

t-test was used to test the above hypothesis, and the results presented in Table 4.

Table 4: Summary of t-test of difference between the Post-test Academic Achievement Mean Scores of Rural Students Taught Basic Technology Using MLS and those Taught with DIS

Group	Mean	SD	Mean Difference	$t_{cal.}$ value	P-value	Decision
Experimental	68.12	9.90	15.15	9.432	0.05	Significant
Control	52.97	7.28				

Critical t value at 5% = 1.96

Data in Table 4 show that at 0.05 level of significance the t-test result ($t_{cal.}$ = 2.483; df=2; P<0.05) revealed a significant difference. Therefore the null hypothesis that there is no significant difference between the post-test academic achievement mean scores of students taught Basic Technology using MLS and those taught with DIS was rejected. This implies that the students' post-test achievement was significantly higher when MLS was used compared to when DIS was used.

Ho_2:

There is no significant difference between the post-test academic achievement mean scores of urban students taught BTE with MLS and those taught with DIS.

t-test was used to test the above hypothesis, and the results presented in Table 5.

Table 5: summary of t-test of difference between the Post-test Academic Achievement Mean Scores of Urban Students Taught Basic Technology Using MLS and those Taught with DIS

Group	Mean	SD	Mean Difference	$t_{cal.}$ value	P-value	Decision
Experimental	63.96	10.23	13.43	8.361	0.05	Significant
Control DIS.	50.53	9.26				

Critical t value at 5% = 1.96

Ho_3:

There is no significant difference between the post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with MLS.

The data related to this hypothesis are presented in Table 6

Table 6: summary of t-test of difference between the Post-test Academic Achievement Mean Scores of Urban Students Taught Basic Technology Using MLS and those Taught with DIS

Group	Mean	SD	Mean Difference	$t_{cal.}$ value	P-value	Decision
Rural	68.12	9.90	4.16	2.59	0.05	Significant
Urban	63.96	10.23				

Critical t value at 5% = 1.96

Ho_4:

Students' school location and instructional strategy (MLS) do not have significant interaction effects on academic achievement in BTE

The data related to this hypothesis are presented in Table7

Table 7 : ANCOVA summary of School Location and Instructional Strategy (MLS) Interaction on Students' Academic Achievement Scores in BTE

Source	Sum of Squares	df	Mean Square	F_{cal}	P-value	Decision
Location	1363.814	1	1363.814	43.401	.000	Significant
Instructional strategy	7211.146	1	7211.146	229.484	.000	Significant
Location /Instructional strategy	646.492	1	646.492	20.574	.000	Significant

a. R Squared = .802 (Adjusted R Squared = .797)

The ANCOVA results (F = 229.484; df = 1; P<0.05), as shown in Table 7 revealed that MLS had a significant and positive interaction effect on BTE students post-test scores. For school location (F = 43.30, df = 1, P<0.05) indicated that school location had a significant interaction effect on the BTE students post-test scores. The interaction effect between the students' school location and instructional strategy (MLS) revealed a significant effect of (F = 20.57; df = 1; P <0.05) on the post-test scores. Therefore the null hypothesis that **S**chool location and instructional strategy do not have significant interaction effects on students' academic achievement mean scores in Basic Technology was rejected.

V. Discussion of Results

Based on the research questions and hypotheses formulated and tested at 0.05 level of significance, the results were discussed as follow;

School Location, Mastery Learning Strategy and Students Academic Achievement in Basic Technology

The analysis of results in Table 6 showed that post-test mean scores of rural and urban students taught BTE using MLS were 68.12 and 63.96, respectively, and the academic achievements mean score difference was 4.16, which showed that rural students performed relatively higher than the urban students. However, t-test result (t = 2.59; df = 2; P< 0.05) revealed a significant difference, also ANCOVA results with (F = 229.484; df = 1; P<0.05), as shown in Table 7 revealed that MLS had a significant and positive interaction effect on BTE students post-test scores. Therefore the null hypothesis that there is no significant difference between the post-test academic achievements mean scores of rural and urban BTE students taught using MLS was rejected. This finding contradict the reports of (Alordiah, Akpadaka, & Oviogbodu, 2015; Igboegwu & Okonkwo, 2012; Owoeye & Yara, 2011) who reported that there were significant differences between rural and urban secondary schools students' academic achievement, with students in urban schools performing higher in their academics than their rural counterpart.

Furthermore, the ANCOVA results on school location (F = 43.30, df = 1, P<0.05) as shown in Table 7 revealed that location of school, has a significant interaction effect on academic achievement of students in BTE. The interaction effect between the students' school location and instructional strategy also revealed a significant effect (F = 20.57; df = 1; P < 0.05) on the post-test scores. Therefore the null hypothesis that School location and instructional strategy do not have significant interaction effects on students' academic achievement mean scores in Basic Technology was rejected. These results concur with that of Agboghoroma (2014) & Lamidi, Oyelekan and Olorundare (2015) who reported positive and significant effect of Mastery Learning Approach (MLA) on students' academic achievement.

VI. Conclusion

Based on the findings of this study, the following conclusions were reached;

The post-test academic achievement of BTE rural and urban students taught using MLS was significantly enhanced over those taught using direct instruction strategy (DIS). There was a significant difference between the post-test academic achievement mean scores of rural and urban students taught Basic Technology (BTE) with MLS, the rural students performed relatively higher than the urban students. Students' school location and instructional strategy (MLS) have significant interaction effects on academic achievement in Basic Technology (BTE)

A. Implications of the study

The findings of the study therefore, imply that school location and instructional strategy positively influence students learning and academic achievement. The implication of this is that if teachers would incorporate Mastery Learning Strategy in teaching and learning process, it would motivate students' interest to learn Basic Technology. Furthermore, it implies that the feedback practices in MLS, if put to work would help students minimize their learning difficulties. The study revealed that the use of MLS improved students' academic achievements in Basic Technology irrespective of school location. It then implies that rural students' academic achievement can be improved with the use of appropriate instructional strategy like MLS.

B. Recommendations

The following recommendations are suggested:

1. Nigeria Government should integrate MLS into teachers' training education institutions
2. The Nigeria government should develop teachers' capacities via in-service training for effective administration of MLS.
3. Rural schools teachers and students should be encouraged by provision of adequate learning facilities by the government and non-governmental organisations .

REFERENCES

[1] Agboghoroma T. E. (2014) Mastery Learning Approach on Secondary Students'Integrated Sciene Achievement British Journal of Education 2(7), 80-88.

[2] Ajagun, G.A. (2006). Towards good performance in science education Nigerian Journal of Teacher Education & Teaching, 2 (1), 17-25

[3] 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 Ph.D Thesis, Ekiti State University, Ado – Ekiti, Nigeria.

[4] Alordiah C. O., Akpadaka, G. & Oviogbodu C. O. (2015). The Influence of Gender, School Location and Socio-Economic Status on Students' Academic Achievement in mathematics

[5] Igboegwu, E. N., & Okonkwo, I. G. A. (2012). Influence of gender and location of school on students'achievement in chemistry. Journal of Research in Education, 1(1), 1-14.

[6] Kissau, S. (2006). Gender difference in motivation to learn French. Canadian Modern Language Review, 62(3), 65-96.

[7] Lamidi, B.T., Oyelekan, O. S .& Olorundare, A. S. (2015). Effects of Mastery Learning Instructional Strategy on Senior School Students' Achievement in the Mole Concept. Electronic Journal of Science Education, 19(5): 1-20

[8] Mankilikl, M. & Dawal, B. S. (2015). Effect of Mastery Learning Approach on the Performance of Boys and Girls in Public Primary School in Basic Science and Technology in Jos Metropolis Nigeria. Asia Pacific Journal of Multidisciplinary Research, 3(5)

[9] Mitee, T.L. & Obaitan, G. N. (2015), Effect of Mastery Learning on Senior Secondary School Students' Cognitive Learning Outcome in Quantitative Chemistry Journal of Education and Practice www.iiste.org 6(5)

[10] Okwor, A.N. (2011). Nigeria's digital divide: A cog in the wheel of vision 20-20-20. Journal of the Science Teachers' Association of Nigeria, 46 (1), 149-164.

[11] Olorundare, A. S. (2014). Correlates of Poor Academic Performance of Secondary School Students in the Science in Nigeria, Paper presented at the international institute for capacity building in higher education Virginia state university, USA.

[12] Oludipe, (2012). Gender Difference in Nigerian Junior secondary students' academic achievement in Basic Science. Journal of Educational and Social Research, 2(1), 93-99.

[13] Owoeye, J.S. & Yara, (2011). School Location and Academic Achievement of Secondary School in Ekiti State, Nigeria. Asian Social Science http://www.ccsenet.org/journal/html/ass/articles/10358.html

[14] Udo, M. E., & Udofia, T. M., (2014). Effects of mastery learning strategy on students' achievement in symbols, formulae and equations in chemistry Science web Publishing Journal of Educational Research and Reviews 2(3), 28-35,

[15] Uzoagulu, A. E. (2011). Practical Guide to Writing Research Project Report in Tertiatary Institutions, CHESTON LTD., Enugu, Nigeria.

[16] Wambugu P. W., (2006). Effects of mastery learning approach on secondary school students achievement, motivation and self-concept in Physics in Kieni East Division of Nyeri District, Kenya. Unpublished M. Ed Thesis, Egerton University.