Location as a Factor in the Prediction of Retention in Automobile Technology

By
Ede, E. O.
emmanuel.ede@unn.edu.ng
Igwe, Ndukwe
ndigwe2001@yahoo.com
+234-8067394652
and
Omego, Godfrey Nwabueze
godfrey.omego@unn.edu.ng
+234-8033559216
Department of Industrial Technical Education
University of Nigeria, Nsukka

Abstract: This study compared two groups of four technical college classes studying automobile engine. One group of two schools is located in rural area and the other group, also from two schools, is located in urban area. They learned automobile engine using computer simulation based on a dynamic, three-dimensional model of automobile engine. The study adopted a pretest, posttest, control group, quasi-experimental research design. There were three weeks (of 45 minutes each) of treatment for the study. Cognitive achievement multiple choice test was used to obtain data for cognitive achievement. Psychomotor rating scale was used to obtain psychomotor performance of the students. The arithmetic mean score of cognitive achievement multiple choice test and psychomotor rating scale constituted the retention score. The correlation coefficients of stability were 0.82 and 0.94 for cognitive achievement and psychomotor performance respectively. The area of the study is Enugu State of Nigeria. 526 NTC 1 (average of 16-17 years old) students of Motor Vehicle Mechanics' Work formed the population of the study; while 106 students were sampled from 4 schools out of the 22 schools managed by Science Technical and Vocational Schools Management Board (STVSMB), Enugu. Arithmetic mean was utilised to answer the research question, while the hypothesis was tested using Analysis of Covariance (ANCOVA) tested at .05 level of significance. The study found that the effect of computer simulation teaching technique on students' retention in automobile engine is greater in rural students than in urban students. It was also found that the difference was significant. Based on the findings, one of the recommendations made is that since rural students performed better than the urban students, the urban students should be guided properly in order to maximize their academic potentialities.

Introduction

Economic activities and modernization are some of the main reasons why the population is different between urban areas and the rural areas. Herald Globe (2014) stated that in addition to land use and density requirements, a requirement that a large majority of the male main working population, typically 75%, is not engaged in agriculture (basically, the subsistence type) and/or fishing is sometimes used to characterize urban area. Due to the primitive and relatively stagnant state of agriculture throughout history, the ratio of rural to urban population remained at a fixed equilibrium. With the onset of the agricultural and industrial revolution in the late 18th century this relationship was finally broken and an unprecedented growth in urban population took place over the course of the 19th century. United Nations Population Division (2008) reported that the

ratio of urban to rural area reached a global record of 50:50 in 2007. Importations of agricultural produce, transportation and communication networks sustain urbanization.

Urban and rural areas are mostly an economic partition due to technological development and population. Williams (2008) reported that economically, Enugu state is predominantly rural and agrarian, with a substantial proportion of its working population engaged in farming, although trading (18.8%) and services (12.9%) are also important. In the urban areas trading is the dominant occupation, followed by services. A small proportion of the population is also engaged in manufacturing activities, with the most pronounced among them located in Enugu, Oji, Ohebedim and Nsukka.

This study sought to find out if the characteristics of urbanization affect retention of the students in urban areas significantly when compared with their equal in the rural areas in Enugu State. Retention of knowledge in automobile technology makes it possible for the students to use the knowledge, they acquired in the school, in the work place where they would work after graduation. Driscoll (2000) stated that retention of knowledge is the ability to maintain the availability of acquired knowledge so that it may be accessed for use at a later time. This implies that a learner who repeats an acquired piece of knowledge with less error is said to have retained the material learnt. Retention of learning means the ability to recall the learnt abilities as and when required at a later date (Abby, 2014). It therefore becomes apparent in the context of this study that evaluation needs to extend beyond post test; for a consideration of the student in terms of their ability to transfer learning. Transfer of learning makes it possible for a student to excel in National Technical Certificate Examination.

National Technical Certificate Examination (NTCE) in Motor Vehicle mechanics' Work (MVMW) comprises of cognitive and psychomotor testing. Igwe (2016) observed that only 4% of the students had distinction in the recent (2011-2014) result of NTCE in MVMW. NTCE is taken at the end of the candidate's learning in the programme. That is, what is examined in NTCE is what the students have retained after the school academic learning sessions. Adepoju and Oluchukwu (2011) and Owoeye and Yara (2011) have found out that the students in urban areas perform better than the students from the rural area in school academic performances due to many reasons, which include the abundance of learning infrastructure and amenities, learning facilities, non proximity to market square, competent teachers and professional counsellors. Interestingly, the result of (2011-2014) of NTCE in MVMW did not attest to the aforementioned assertions as both the rural and urban students had average academic performances in NTCE in MVMW. This study sought to find out the performances of urban and rural students, in Enugu State, immediately after the students returned from the mid-term break. This is to ascertain whether the activities of the students during the holiday period affect their academic performances (cognitive and psychomotor) in MVMW. Urban and rural areas have some characteristics that distinguish them, one of which is population size.

Population size is used, in this study, to distinguish the rural area from the urban area. In Nigeria, a rural area is defined as an area having a population of less than 20,000 persons and urban area having a population of 20,000 and above persons (National Population Commission, 2003). Communities where the technical colleges are situated are used as areas defined above. Therefore, according to the population census results of 1991, any community in Enugu State having a population of less than 20, 000 persons are here referred to as rural area and the areas with 20,000 persons and above is here referred to as urban areas. Also schools located in the rural areas are here referred to as rural schools and schools located in the urban areas are here referred to as urban schools. The results of the 1991 population census were used because the results of the 2006 census

do not contain community level data. The experiment in this study sought to find out if there would be positive effect when teaching automobile technology to urban students as against the rural students in technical colleges in Enugu State. Computer simulation teaching technique was used to teach the students.

Computer simulation teaching technique is taken here to refer to classes using computer simulation as a replacement for or supplement to conventional classroom instruction in order to teach students. Conventional teaching method on the other hand is taken here to refer to classes using traditional methods of instruction, that is, non-computer-based methods, to teach students. The basic replacement in this study is in the learning resources, that is teaching materials. Kalekar (2015) stated that learning resources are texts, videos, software, and other materials that teachers use to assist students to meet the expectations for learning. Computer simulation teaching technique in this study used system model (simulation video and Lotus Engine Simulation) as a replacement to physical model and charts respectively. In Enugu State technical colleges, teachers use traditional methods of teaching. They use charts to teach for cognitive achievement and physical automobile model to teach for psychomotor performance. This traditional method has not improved the academic performances of the students substantially. Therefore, the need to try out any other alternative; one of which is computer simulation teaching technique as one of computer assisted instruction.

In order to achieve the aforementioned, a research question and a hypothesis were used. The research question asked is what are the retention scores of urban and rural students of Motor Vehicle Mechanics' Work taught using computer simulation teaching technique? The null hypothesis was that there is no significant difference between the mean retention scores for urban and rural students taught using computer simulation teaching technique.

Methods:

In this study, a quasi-experimental research design of pre, post and retention tests model was used. This study was carried out on 49 NTC 1 students in second term of 2015/2016 academic session. The study involved two groups of subjects. They are the urban and the rural students. The groups were taught using computer simulation teaching technique. Only the scores of students who participated in pretest, treatment, post test and retention test were taken to analyse the data; therefore the urban group consists of 20 students and that of the rural group was 14 students. The study was conducted in Enugu State, Nigeria. The arithmetic mean of cognitive achievement multiple choice test and psychomotor rating scale of the performances of the students on the tests they took three weeks after the post test formed the retention of the students in the study. The post test scores were also the arithmetic mean of cognitive achievement multiple choice test and psychomotor rating scale of the performances of the students on the tests they took one week after the treatment.

The study was conducted during the school lesson period. It followed the classes' time table of Motor Vehicle Mechanics' Work. The regular school Motor Vehicle Mechanics' Work teachers were used in the study. Pretest was administered to both groups before the commencement of the lessons. During the lessons, computer simulation teaching technique lesson plan was used to teach the students. The regular Motor Vehicle Mechanics' Work teachers who were involved in the study were trained on how to teach the selected topics using computer simulation. This was done before the pretests. After the training and pretests, then the treatment (that is actual teaching) commenced. Each lesson lasted for a period of 45 minutes, two periods in a week and the lessons were a period of three weeks. A total of six lesson periods were therefore involved in the study. At the end of the lessons, post tests were administered to both groups. Three weeks after the post test,

a retention test was conducted. The data collected from the pretest, post test and retention test were used for further analysis. The analysis determined if there were significant differences in the retention feats between the two groups.

Results: The results are presented according to the research question and hypothesis that guided the study.

Research Question

What are the retention scores of urban and rural students of Motor Vehicle Mechanics' Work taught using computer simulation teaching technique?

The answer to this research question is provided in table 1.

Table 1

Mean Scores of Post-test and Retention-test of Urban and Rural Students of MVMW taught using Computer Simulation Teaching Techniques

Techniques	N	Post-test	Retention-test	Mean Gain
		$\overline{X}$	$\overline{X}$	
Urban	**20**	**51.81**	**54.07**	**2.26**
Rural	**14**	**41.12**	**46.09**	**4.97**

Table 1 shows that urban students taught MVMW using CST technique had a mean score of 51.81 in the post-test and a mean score of 54.07 in the retention-test; making a post-test, retention-test mean gain in the urban students to be 2.26. Meanwhile, rural students taught MVMW using CST technique had a mean score of 41.12 in the post-test and mean score of 46.09 in the retention-test; making a post-test, retention-test mean gain in the rural students using CST technique to be 4.97. With this result rural students taught using CST technique had a higher mean retention scores than urban students in MVMW retention test. Thus, there is an effect attributable to location on the retention of students taught Motor Vehicle Mechanics' Work using CST technique in favour of the rural students.

Null Hypothesis:

There is no significant difference between the mean retention scores for urban and rural students taught using computer simulation teaching technique. The data analysed for this hypothesis is presented in Table 2.

Table 2

Summary of Analysis of Covariance (ANCOVA) for Test of Significance between the Locations with respect to their Mean Scores on the MVMW Retention Test

Source of Variation	Type III Sum of Squares	Df	Mean Squares	F	Significance of F
Corrected Model	524.187[a]	1	524.187	16.871	.000
Intercept	73007.732	1	73007.732	2349.780	.000
Location	524.187	1	524.187	16.871	.000
Error	994.241	32	31.070		
Total	79143.250	34			
Corrected Total	1518.429	33			

a. R Squared = .345 (Adjusted R Squared = .325)

The data presented in Table 2 shows that F-calculated value for location is 16.871 with a significance of F at .000 which is less than 0.05. The null hypothesis is therefore rejected at 0.05 level of significance. With this result there was significant difference between the mean retention scores of urban and rural students taught MVMW using computer simulation teaching technique.

Discussion:

The data presented in Table 1 shows that rural students taught Motor Vehicle Mechanics' Work using computer simulation teaching technique had a mean gain of 2.71 over the urban students. With this result, rural students taught Motor Vehicle Mechanics' Work using computer simulation teaching technique had higher mean score than urban students in the retention test. Thus; there is an effect attributable to location on the retention test of students taught Motor Vehicle Mechanics' Work using computer simulation teaching technique. However, this could be attributed to lower post test scores of the rural schools who must have relearn and over learn like the urban students. In addition, it could also be attributed to the life styles of the city/urban life during the midterm break (a period of break before the retention test when other informal academic interferences must have taken place). Behrendt (2014) affirmed that most urban students are carried away by city life. Some abandon their studies and embrace watching of late night movies, hanging out with friends and surfing the web (Internet) and engaging in internet social networking.

Analysis of covariance explained the hypothesis in table 2. It revealed that the calculated F-value for the achievement of urban students stood at 16.871 with a significance of F at .000 which is less than 0.05. The null hypothesis is therefore rejected at 0.05 level of significance. With this result, there was a statistical significant difference between the mean retention scores of urban and rural students taught Motor Vehicle Mechanics' Work using computer simulation teaching technique. This result showed that the effectiveness of computer simulation teaching technique on students' retention in MVMW does depend on the level of location. Hence, there were differential effects of treatment over level of location (urban and rural) which implies that conventional teaching method is more effective in improving rural students' retention in MVMW.

Conclusion

This study was set out to determine effect of computer simulation teaching technique on technical college students' academic achievement and retention in Enugu State. In the conduct of the study, the study took into consideration location (urban and rural) as a moderator variable which can influence the dependent variables. The study revealed that computer simulation teaching technique is more effective in improving students' retention in rural area than the urban area. The result also revealed a significant difference between the mean retention of urban and rural students taught MVMW using computer simulation teaching technique.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. National Board for Technical Education (NBTE) should consider review of curriculum for Motor Vehicle Mechanics' Work with a view to incorporating computer simulation teaching technique into the teaching of Motor Vehicle Mechanics' Work.
2. In order to promote academic achievement in Motor Vehicle Mechanics' Work; their teachers and school administrators should incorporate the use of computer simulation teaching technique in their teaching Motor Vehicle Mechanics' Work.
3. Workshops, seminars and conferences and in-service training should be organized by the government and professional bodies like the National Board for Technical Education (NBTE) and the Nigerian Association of Teachers of Technology NATT on the use of computer simulation teaching technique for improving students' performance in Motor Vehicle Mechanics' Work.
4. There should be regular periodic review for corrective feedback in order to encourage retention of academic achievement.
5. Students should be encouraged to learn at their own pace and solve problem in group using computer simulation. This will help to promote self-confidence because it gives the students a feeling of control over what they are learning.
6. Teachers training tertiary institutions, where Information and communication Technology (ICT) has not been introduced, should include ICT in their curricula and impact the use of computer simulation instruction strategy to the student teachers.
7. Since students from different location (urban and rural) have peculiar problems due to where their schools were situated, they should be guided properly in order to maximize their academic potentialities.

REFERENCES

Abby, R. (2014). *Transfer of Training*. Retrieved from http://www.slideshare.net/WelingkarDLP/chapter-8-transfer-of-training

Adepoju, T. L & Oluchukwu, E. E. (2011). A study of secondary school students' academic performance at the senior school certificate examinations and implications for educational planning and policy in Nigeria. *An International Multidisciplinary Journal, Ethiopia. 5 (6).* DOI: http://dx.doi.org/10.4314/afrrev.v5i6.26

Behrendt, M. (2014). A review of research on school field trips and their value in education. *International Journal of Environmental & Science Education*. DOI: 10.12973/ijese.2014.213a

Driscoll, M. P. (2000). *Psychology of learning.* Retrieved from http://www.adlnet.org/wp-content/uploads/2014/12/learning-sciences-retention-and-sustainment-083013-FNL-V3-SG.pdf.

Herald Globe (2014). *City population to reach 6.4bn by 2050*. Retrieved from http://www.heraldglobe.com/index.php/sid/223727231

Igwe, N. (2016). Effect Of Computer Simulation Teaching Technique on Technical College Students' Cognitive Achievement, Psychomotor Performance and Retention. *Unpublished Ph.d Thesis*. University of Nigeria, Nsukka.

Kalekar, S. (2015). *Styles of learning.* Retrieved from https://sites.google.com/site/myvirtualcourse/learning-styles.

National Population Commission (2003). *The 2003 Nigeria demographic and health survey: Findings and implications for action South East Zone*. Retrieved from http://www.hindawi.com/journals/ijpr/2013/610193/

Owoeye, J. S. & Yara, P. O. (2011). "School location and academic achievement of secondary school in Ekiti State, Nigeria". DOI:10.5539/ass.v7n5p170

United Nations Population Division (2008). *World urbanization prospects: the 2007 revision*. United Nations, New York. Retrieved from http://www.un.org/esa/population/publications/wup2007/2007WUP_Highlights_web.pdf

Williams, L. (2008). *Nigeria: the bradt travel guide*. bradt travel guides. Retrieved from books.google.com.ng/books/about/Nigeria. html?id