

BUSINESS EDUCATION STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION OF SELECTED TOPICS IN ENTREPRENEURSHIP IN FEDERAL COLLEGE OF EDUCATION (TECH) UMUNZE: AN AUGMENTED REALITY PERSPECTIVE.

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Abstract

The study examined the achievement and retention of selected topics in Entrepreneurship In Business Education topics among NCE year three students of Federal College of Education (Tech), Umunze, Anambra state using augmented reality (AR) approach. A quasi-experimental design was adopted. The population was 104, consisting of all NCE year three students of FCE(T), Umunze. The whole population was used hence no sampling and sampling technique. The instrument for data collection was Entrepreneurship in Business Education Achievement Test (EBEAT). Data collected were analysed using mean for research questions and ANCOVA for hypotheses at 0.05 level of significance. Result of the study revealed that AR is more effective in improving achievement and retention of selected topics in entrepreneurship in Business Education than demonstration teaching method. When AR was adopted in teaching selected entrepreneurship in Business Education topics to students, they perform better in their examinations. It was recommended, among others, that teachers should adopt AR in teaching and learning of entrepreneurship in business education and other fields of study.

Keywords: Augmented Reality, Academic achievement, Retention, Entrepreneurship

Introduction

Entrepreneurship in business education was designed to provide learners with skills, knowledge and motivation to encourage entrepreneurial success in a variety of setting. Being a course that is capable of providing learners with jobs after school, it ought to be taught well to ensure that students acquire the necessary knowledge and skills for employment after graduation. Lucas, Spencer and Claxton in Akamobi (2021) noted that the effectiveness of any skill-oriented educational process depends largely on the quality of teaching and learning in the classroom, workshop or laboratory. Observation suggests that entrepreneurship in business education is usually taught using lecture and demonstration teaching method. The lecture and demonstration methods however, do not seem to aid critical and creative thinking as well as collaborative problem solving (Garzon & Acevedo, 2019). It is incapable of providing the effect needed to cope with the challenges of rapid technological development in a globalized world. It is therefore pivotal that entrepreneurship in Business Education teachers realize the need for a better understanding of what method to use in teaching and learning of the course as it greatly determines students' acquisition of knowledge and skills. Again, the use of technology in education has been known to foster learning (Singaravelu & Sivakumar, 2020; Kumar, 2020; Wei, Kuah, Ng & Lau, 2020; Sahota, 2023). They create interactive and engaging learning experiences which help to improve students' problem-solving and critical thinking skills (Garzon & Acevedo, 2019). Students' critical thinking as well as knowledge synthesis should be engaged in order to develop problem-solving skills by utilizing learner-centered approaches like augmented reality (AR).

Augmented reality (AR) interface was developed and introduced by Sutherland I. in 1968. From its name, we deduce that this approach "augments" the real world around us. It does this by superimposing digital information over the real world which creates an interactive experience for students (Singaravelu & Sivakumar, 2020). With the advent of new

technologies, such as augmented reality, there is an opportunity to explore new and innovative ways of teaching. Augmented reality allows learners to visualize and interact with digital contents which give users an enhanced experience in a way that is not possible with traditional methods (Kumar, 2020). Learners are able to perform physical experiments in a virtual world. This makes them learn through experimental learning as they try several iterations to find out the best and the most suitable combinations. AR applications can run over and offer interesting services through tablets and mobile phones with full range of features (Singaravelu & Sivakumar, 2020). While augmented reality has been used in various fields, its use in education, particularly in teaching business concepts and skills, is still in its infancy. Augmented reality has the potential to revolutionize the way students learn, by providing an immersive and interactive experience that can make complex concepts easier to understand while improving students' engagement and motivation (Sahota, 2023). Sahota noted also that AR enhances the retention of information since they can understand better and visualize complex concepts making them more likely to remember the information long-term. Similarly, Garzon and Acevedo (2019); Akcayir and Akcayir (2017) submitted that AR is able to transform dull monotonous learning instructions into an exciting and engaging environment eventually improving students' performance. This means that AR may boost retention and academic achievement.

Academic achievement means the successful result of interaction between a teacher and a student (Igbo & Ihejieme in Akamobi, 2021). It measures a learner's level of knowledge or skill accomplishment in a specific area. Academic achievement determines the efficacy of instruction and is also useful in testing retention of skill or information. Nya (2023) submitted that academic achievement is in collaboration with retention. The major problem faced by most students is inability to remember what they have learnt and this can result to students' performing poorly in achievement tests (Ta & Alaa, 2020). Retention in entrepreneurship in business education is not gotten by listening to the teacher teach or mere memorization rather, it is gotten through students' active participation which is dependent on the use of appropriate teaching method. Singaravelu and Sivakumar (2020) elucidated that students learn and retain more when they develop their own knowledge and meaning from their own experience. Sahota (2023) revealed that using AR in teaching could improve students' achievement and retention. Several studies have explored the potential of augmented reality in education, but there is still a lack of research on its effectiveness in teaching business concepts and skills. This gives impetus to the study on business education students' academic achievement and retention of selected topics in entrepreneurship in Federal College of Education (Tech) Umunze: An augmented reality perspective.

Statement of the Problem

The aim of any teaching and learning process is to cause a positive change in the mind of the learner. It is to enable the learner to perform or do something well in specific and broad situations (Kumar, 2020). Business education programmes generally and entrepreneurship in business education specifically provides skills in new and emerging jobs and innovations to fit-in in the world of work or to become self-reliant. Federal Republic of Nigeria (2014) in her National Policy on Education posited that the goal of entrepreneurship education is based on students' performance. Sadly, in F.C.E.T Umunze, students' academic achievements in entrepreneurship in business education seem to be dwindling. (Isa, Mammam, Bala & Badar, 2020) and (Nya, 2023) submitted that students' poor academic achievement is as a result teaching method used by the teacher which is mainly teacher-centered.

Observation of the school system suggests the teachers seem to use more of lecture and demonstration methods in teaching entrepreneurship education. They seem to rarely use other methods and approaches. Consequently, students appear not to retain what has been taught and

probably may have low academic achievements. The problem of this study therefore is to investigate whether augmented reality improved Business Education students' academic achievement and retention of selected entrepreneurship concepts in Federal College of Education (Tech) Umuze.

Purpose of the study

The main purpose of this study is to determine the academic achievement and retention of selected entrepreneurship concepts in Federal College of Education (Tech) Umuze: An augmented reality perspective. Specifically, the study determined:

1. The academic achievement mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.
2. The retention mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.

Research Questions

The following research questions guided the study:

1. What is the academic achievement mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.
2. What is the retention mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.

Hypothesis

The following null hypotheses were formulated for the study:

1. There is no significant difference in the academic achievement mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.
2. There is no significant difference in the retention mean scores of students taught selected topics in entrepreneurship using demonstration teaching method and those taught using augmented reality.

Methodology

The study adopted quasi-experimental design. Specifically, the pre-test, post-test non-equivalent treatment group design was adopted for the study. The design was adopted because it was not possible for the researchers to randomly select the subject and assign them to groups without disrupting the academic programme and the time table of F.C.E. (T) Umuze. The study was carried out in Anambra state, Nigeria. The population of the study comprised the entire 104 NCE year three students in the school of business education, F.C.E.(T), Umuze. The whole population was used, hence no sampling and sampling technique. The 104 students were grouped into four intact classes. Two intact classes were randomly assigned control group while the remaining two intact classes were randomly assigned experimental group. The control group has 45 females and 11 males while the experimental group has 35 females and 13 males.

The instrument for data collection was Entrepreneurship in Business Education Achievement Test (EBEAT) for measuring achievement and retention of entrepreneurship in business education students of Federal College of Education (Tech) Umuze. The instrument consists of 40 multiple choice questions based on the minimum standard of Federal Republic of Nigeria, National Commission for Colleges of Education, Abuja. EBEAT was designed to cover the following contents: market segmentation, consumer behavior and human resource management which were taught during the study. The instrument EBEAT was validated by

three experts, two from the department of Business Education and one from the department of Measurement and Evaluation, all from the Faculty of Education, Nnamdi Azikiwe University, Awka. The reliability of the instrument was determined by administering the instrument to a trial group of year three students in the school of business education, Nwafor Orizu College of Education, Nsugbe. Reliability co-efficient of the score was established using Kuder-Richardson 20 formula which yielded 0.87. The researchers who are the course lecturers conducted the experimental treatment. Pre-test was administered to both the experimental and control groups after which proper teaching started by using a prepared lesson plan. Each lesson lasted 1hour and the treatment for 4 weeks. At the end of the treatment, a post-test was administered on both groups with the EBEAT and after two weeks interval delay, post-test was administered to both groups. Data collected were analyzed using mean scores and standard to answer research questions and the null hypothesis were tested using Analysis of Covariance (ANCOVA) at 0.5 level of significance.

Results

Table 1. Mean and Standard Deviation of Students' Academic Achievement Mean Scores in selected Topics in Entrepreneurship in Business Education for Demonstration and Augmented Reality Groups.

Group	N	Pre-test		Post-test		Mean Gain
		X	SD	X	SD	X
Control (Demonstration)	56	36.79	8.34	47.42	8.98	10.63
Experimental (Augmented Reality)	48	36.43	7.21	60.55	9.24	24.12

Table 1 shows that pre-test, post-test achievement mean scores of demonstration group are 36.79 and 47.42 and the standard deviation group of 8.34 and 8.98. 10.63 is the mean gain. The augmented reality group had a pre-test and post-test achievement mean scores of 36.43 and 60.55 with the standard deviation of 7.21 and 9.24. The mean gain is 24.12. However, for each of the groups the post-test achievement mean scores were higher than the pre-test achievement mean scores with augmented reality group having a higher mean gain. The result indicates that augmented reality approach improved students' achievement better than demonstration teaching method.

Table 2. Mean and Standard Deviation of Students' Retention Mean Scores in selected Topics in Entrepreneurship in Business Education for Demonstration and Augmented Reality Groups.

Group	N	Pre-test		Post-test		Mean Gain
		X	SD	X	SD	X
Control (Demonstration)	56	47.42	8.98	47.72	8.84	.30
Experimental (Augmented Reality)	48	60.55	9.21	61.89	9.36	1.34

Data in Table 2 shows that the post-test, delay post-test retention mean scores of demonstration group are 47.42 and 47.72 with standard deviation of 8.98 and 8.84. The mean gain is 0.30. The augmented reality group had a post-test and delay post-test retention means

scores of 60.55 and 61.89 with standard deviation of 9.21 and 9.56 The mean gain of augmented reality group is 1.34. This shows that each of the group has a mean gain with augmented reality group having a higher mean gain. This indicates that students taught with augmented reality retained knowledge more than students taught with demonstration teaching method.

Table 3. ANCOVA Summary of Teaching Methods on Students' Academic Achievement Mean Scores in Selected Topics in Entrepreneurship in Business Education.

Source	Sum of Squares	Df	Mean of Squares	F-cal	Sig	Remark
Teaching Methods	1081.666	2	540.833	13.629	0.000	Rejected
Error	4007.959	101	39.683			
Total	639448.000	108				

Table 3 shows that the p-value of 0.000 was obtained for teaching methods on students' academic achievement mean scores in selected entrepreneurship in business education topics. Since the p-value of 0.000 is less than 0.05 level of significance, this shows that there was a significant difference between the academic achievements means scores of NCE year three students taught selected entrepreneurship in business education topics using demonstration teaching method and those taught using augmented reality. The null hypothesis was therefore rejected.

Table 4. ANCOVA Summary of Teaching Methods on Students' Retention Mean Scores in Selected Topics in Entrepreneurship in Business Education.

Source	Sum of Squares	Df	Mean of Squares	F-cal	Sig	Remark
Teaching Methods	1127.070	2	563.535	14.405	0.000	Rejected
Error	3951.171	101	39.121			
Total	630038.000	108				

In Table 4, the data shows that the p-value of 0.000 was obtained for teaching methods on students' retention mean scores in selected entrepreneurship in business education topics. since the p-value of 0.000 is less than 0.05 level of significance This shows that significant difference exists between the retention mean scores of NCE year three students taught selected entrepreneurship in business education topics using demonstration teaching method and those taught using augmented reality. The null hypothesis was therefore rejected.

Discussion

The data presented in Table 1 provide answer to research question one, findings revealed that students taught selected topics in entrepreneurship in business education using augmented reality performed better with a mean gain of 24.12 than the group taught using demonstration method with the mean gain of 10.63 However, results in Table 3 indicates that the difference in the mean gain is significant. With F-ratio of 13.629 and p-value of 0.000 which is less than 0.05 level of significance The null hypothesis which stated that there is no significant difference between the academic achievement mean scores of students taught selected topics in entrepreneurship in business education using demonstration teaching method and those taught using augmented reality was rejected. This implies that there was significant differences between the academic achievements mean scores of students taught selected topics in entrepreneurship in business education using demonstration teaching method and those taught using augmented reality. The finding is in line with the finding of Sahota (2023) who

reported that academic performance of students taught using augmented reality improved significantly better than those taught with demonstration teaching method. The finding also supports Akcayir and Akcayir (2017) submitted that AR is able to transform dull monotonous learning instructions into an exciting and engaging environment eventually improving students' performance.

The result obtained for research question two showed that students exposed to augmented reality had a higher retention mean gain of 134 than students exposed to demonstration teaching method with the retention mean gain of 0.30. The result in Table 4 indicates that the difference in the mean gain is significant. With F-ratio of 14.405 and p-value of 0.000 which is less than the 0.05 level of significance. The null hypothesis which stated that significant difference does not exist between the retention mean scores of students taught selected topics in entrepreneurship in business education using demonstration teaching method and those taught using augmented reality was rejected. This implies that significant difference exists between the retention mean scores of students taught selected entrepreneurship in business education topics using demonstration teaching method and those taught using augmented reality. In other words, in augmented reality classroom, students internalize and retain what they are taught. A teacher can encourage students to internalize their learning by informing the students what the learning content/experience is all about, what the specific objectives are; what tools are to be used to motivate them and help to achieve the objectives. The finding is in consonance with the assertion of Sahota (2023) that AR enhances the retention of information by students since they can understand better and visualize complex concepts making them more likely to remember the information long-term.

Conclusion

The findings of this study revealed that augmented reality is more effective in improving students' academic achievement and retention in selected topics in entrepreneurship in business education than demonstration teaching method. Significant difference was established between the retention mean scores of students taught selected topics in entrepreneurship in Business Education using demonstration teaching method and those taught using augmented reality. This is due to the fact that the result revealed that NCE year three students taught selected topics in entrepreneurship in Business Education using augmented reality had a higher mean gain for achievement and retention than their counterparts taught using demonstration teaching method. It follows therefore that if augmented reality is adopted in teaching entrepreneurship in Business Education in FCE(T), Umuze, students will perform better in examinations and retain what they have learnt. This will enable them acquire needed skills that will enable the graduate to be self employed or gainfully be employed in industries.

Recommendations

The following are recommended based on the findings:

1. Teachers of entrepreneurship in business education should adopt augmented reality or other related technologies in teaching entrepreneurship in business education in order to enhance knowledge mastery and retention among students.
2. Business education teachers should be sensitized and sponsored by government and other stakeholders to attend workshops, seminars and conference to receive training on the use of digital technologies in teaching.
3. Curriculum planners should collaborate closely with Business Education experts to develop a workable entrepreneurship curriculum that effectively incorporates digital technologies.

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