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Research Article

The Effect of 3D Computer Animated-Content Coaching Style on Student Academic Feat in Motor Vehicle Mechanics Work in Technical Colleges

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Abstract

The impacting of knowledge/skills in the technical college in the recent time in the modern world is by coaching students with 3D computer animated-content in the Western world. The usage of the 3D computer animated-content, makes coaching to be real to students, they see and feel the objects which they use to learn. Eighty-one (81) students was deployed for the probe, sampling of students was not done because of the population that was deployed for the probe, all the students that offers motor vehicle mechanics work in the selected technical colleges were deployed for the probe. The apparatus that was deployed for the probe was motor vehicles mechanics work feat test, was validated using fifteen students from practical college in Anambra State. Three lecturers were deployed for the validation, after the validation a reliability test was conducted and it was detected that the reliability of the apparatus was 0.73, meaning that the apparatus was reliable. Two probe question were raised to guide the probe and two hypotheses were formulated at 0.05 level of implication, to check for level of implication using (ANCOVA) to check the level of implication. Findings were made, and conclusion was also made by the investigator at the end of the probe.

Keywords

3D Computer Animated-Content, Coaching Styles, Academic Feat, Motor Vehicle Mechanics Work

1. Introduction

The new method for imparting knowledge/skills to students in technical colleges in the 21st century is through the adoption of animated-content Coaching Styles. Animated content involves bringing unanimated objects to life through computer graphics, injecting energy and motion into seemingly lifeless objects. [11] Computer-animated content is a process that involves capturing successive drawings, models, or puppets to create the illusion of movement in a sequence [11]. Our eyes can only hold an image in memory for approximately one-tenth of a second, and the brain combines many moving pictures when they are exhibited quickly. Computer-animated material is described as a method for simulating motion on a screen by capturing a figure of distinct dynamic sequences [1]. Still, pictures may be given alive through computer-animated material, which has uses in a variability of industries like amusement, computer-assisted design, science imagining, graphic art, and education.

Investigators in chemistry education have found that animated graphics enhance students' grasp of chemical concepts. Computer-animated material has affected erudition and in-

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struction in a variability of sectors, including economics, industry, medicine, tourism, and education. It is highly recommended for describing patterns and Styles in natural scientific education.

Computer-animated content has acted as protuberant eye of technology-based erudition settings for the past two decades [19]. Their Many teachers are now incorporating animated cartoons into coaching of physics and other science subjects, making erudition more accessible to students [6] note that animated cartoons engage students in economics and micro-economics studies, simplifying these subjects within social sciences.

The use of analogical visualization with graphics to facilitate the creation of mental models through animated content [7], which can help illustrate phenomena or concepts that might be challenging to visualize during the teaching/erudition process in schools [13]. The efficacy of computer animated content in enhancing students' grasp depends on their interests, memory, and cognitive load in the classroom.

Computer-animated content can be designed to reduce cognitive overload for students during the teaching/erudition process by visualizing essential information [3] Computer animated content comes in two forms: 2D animated content in two dimensions and 3D animated content in three dimensions. This probe primarily focuses on 3D animated content, which encompasses the capabilities of 2D computer animated content to represent objects in three dimensions, creating perfect three-dimensional animated contents. The use of 3D animated content in schools has been shown to improve students' erudition habits. [21] found that combining 3D computer animated-content with traditional coaching improved the recital of high school biology students. Similarly, the coaching of chemical bonding using 3D computer-animated content was found to be more effective than traditional coaching methods [10]. Also reported that 3D computer animated-content improves students' academic feat in mathematics and statistics [2].

Building on these findings, the investigator in this probe aims to apply 3D computer content as a coaching Style for technical college students, secondary school students, and tertiary students to assess its impact on academic feat in the probe of motor vehicle mechanics works (MVMW) as a trade subject in schools.

2. Academic Feat

Academic feat is a term often deployed interchangeably with academic recital, and it denotes the degree to which a student, teacher, or institution has met their educational focus. In the framework of this probe, the focus is on student feat, which pertains to what students can demonstrably do upon completing a course of probe that leads to graduation.

Several factors in the school environment contribute to supporting student academic feat. They conducted a probe suggesting that variables within the educational framework play a significant duty in fostering and maintaining academic feat in schools [15]. Factors by way of the bond between students and teachers and the classroom climate are positively associated with levels of student feat [12]. Disparities may also exist in students' academic feat related to subject areas, socioeconomic status, and gender. There are three sorts of differences in subject areas [14]:

3. Variation in Actual Attainment

1) Discrepancy in participation frequency
2) Divergence in classroom atmosphere

Investigators have noted that students hailing from deprived upbringings often experience greater educational advantages in comparison to their more privileged counterparts. To put it differently, students from destitute homes often achieve higher academic success than those from advantaged backgrounds. This is because students from destitute backgrounds tend to be more self-reliant and less affected by socioeconomic factors [9]. They make the utmost of the resources obtainable to them, as supported by findings by way of those who indicated a bond between technology use and academic feat, although establishing a causal bond has proven challenging [16]. Numerous studies have demonstrated that the existence of educational resources at home, by way of computers, is a strong predictor of high academic feat in science [4]. The upshot of computer-based technology on children's academic feat remains uncertain [18]. Nonetheless, certain obtainable data indicates that owning a personal computer at home is linked to enhanced academic recital.

3.1. Coaching Styles

Motor vehicle mechanic work (MVMW) is a vocational training regimen offered in technical colleges and other designated skills acquisition centers, and it follows an informal, apprenticeship-based mode of instruction. The primary focus of this regimen is to produce skilled motor vehicle artisans who can donate to the technological and industrial development of society. Upon completion of their training, individuals who have acquired MVMW skills are expected to find gainful employment or become self-starting.

In technical colleges, MVMW is primarily learned within workshop settings. As per [8], a workshop is a dedicated space equipped with machines, tools, workbenches, and other materials deployed for vehicle repair. This environment serves as a hands-on erudition space where students can acquire knowledge and skills.

For active teaching/erudition in technical colleges, the usage of coaching styles is crucial. The term "coaching Style" denotes the general principles, pedagogy, and management strategies employed in the teaching/erudition process. Teachers' intention is to make their lessons engaging and meaningful for students. In this framework, the chosen coaching Style is 3D computer-animated content. This style is

envisioned to make the erudition process more engaging and comprehensible.

Coaching in the school system typically falls into two sorts or approaches: teacher-centred and student-centred. The adoption of 3D computer-animated content aligns with the student-centred approach, which prioritizes student involvement and energetic erudition.

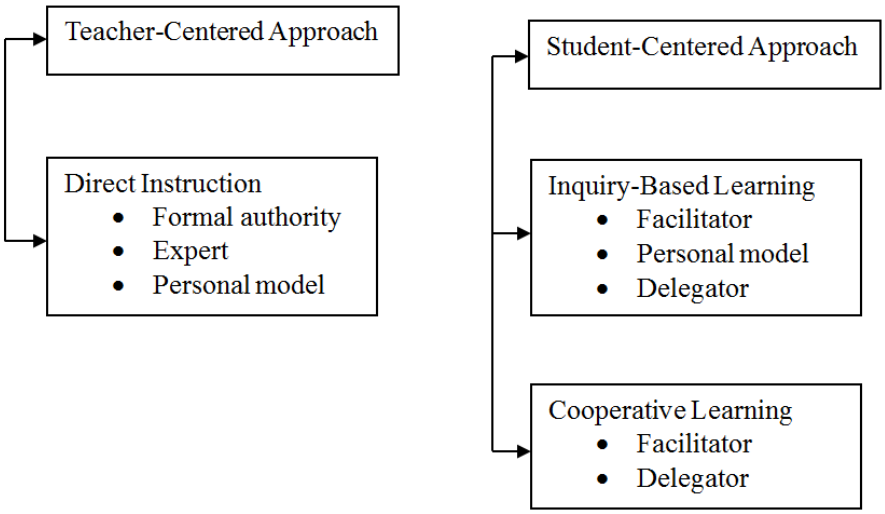

Figure 1. *Approach of Teaching/erudition Style.*

Figure 1 shown above is the diagram of two approaches to teaching/erudition Styles that is centred on the "teacher" as the master and the student as the learner.

3.2. Teacher-Centered Approach to Erudition

In this educational model, the teacher assumes the central duty as the primary authority figure. Students are often perceived as passive recipients, described metaphorically as "empty vessels," and their primary function is to passively receive information, typically delivered through methods by way of lectures and unswerving tuition. It is the teacher's main duty to provide expertise and data to the students. Additionally, this paradigm treats instruction and assessment as discrete and different parts. The bulk of testing and assessment techniques that are quantitatively assessed and objectively evaluated are deployed to evaluate student erudition.

3.3. Student-Centered Approach to Erudition

In classrooms where teachers assume the duty of authority, students actively participate in the process. Within this framework, teachers act as coaches and facilitators of student erudition, focusing on promoting a comprehensive sympathy of the subject matter. This is realized by employing a blend of both structured and informal assessment techniques, encompassing group projects, student portfolios, and active participation in class. In this method, coaching and evaluation are intricately linked, with continuous assessment unfolding alongside the teacher's instructional journey. A deeper comprehension of the teacher-centred/student-centred approaches as educational models becomes evident when we consider the enactment of the three main educational pedagogies.

4. Statement of the Problem

The academic feat of students in technical colleges is closely tied to the coaching Styles employed by their teachers. They have highlighted a significant challenge facing technical college students in Nigeria: the issue of teacher incompetence in utilizing modern coaching Styles like 3D computer-animated content [20]. Many teachers tend to focus predominantly on theoretical instruction rather than practical aspects. This imbalance in the delivery of skills and knowledge has had a damaging impact on students' academic recital, particularly in subjects like motor vehicle mechanics in Nigeria.

5. Purpose of the Probe

The probe aims to ascertain how 3D computer-animated content affects students' academic performance. Additionally, to ascertain the impact of gender on the academic performance of students' probing motor vehicle mechanics, 3D computer-animated content was deployed.

6. Probe Questions

The following probe questions were raised to guide the probe:

1) How does the use of 3D computer-animated content

impact the academic performance of students studying motor vehicle mechanics?

2) What influence does gender (male and female) have on the academic achievement of students learning motor vehicle mechanics with the integration of 3D computer content?

Hypotheses

The following null hypothesis was tested at a 0.05 level of implication

1) The mean academic achievement scores of students instructed with 3D animated content do not exhibit a statistically significant difference when compared to those taught by other means in motor vehicle mechanics work.
2) The mean academic achievement scores of male and female students receiving instruction in motor vehicle mechanics with 3D computer animated-content do not demonstrate a statistically significant difference.

7. Methodology

7.1. Design of the Probe

This probe utilized a quasi-experimental design, employing a two-group experimental design consisting of both a control group, which underwent the pre-test, and an experimental group, which underwent the post-test.

7.2. Area of the Probe

The probe was conducted in the South-South geopolitical zone of Nigeria, specifically in the states of Delta and Edo. These two states are part of the 36 states comprising the Federal Republic of Nigeria. The probe made use of four well-established technical institutions located within these states, including Sapele and Asaba Technical Colleges in Delta State, and Benin and Uromi Federal Technical Colleges in Edo State. Various other technical colleges in the region were also selected for inclusion in the study.

7.3. Population of the Probe

The probe population consists of a total of 81 students hailing from four technical institutions located in the Delta and Edo states. These students are currently in their final year of technical education (Tech III) and are preparing for the National Business and Technical Examination (NABTEB). The probe focuses on topics that are typically covered in the last year of the motor vehicle mechanics work curriculum. Therefore, the study specifically targets these final-year students.

7.4. Sample and Sampling Style

Given the nature of the probe topics under investigation, a student sample was not used in this study. Rather, the probe encompassed the entirety of final-year students specializing in Motor Vehicle Mechanics Work at the selected technical institutions. Essentially, every student within these classrooms participated in the probe.

7.5. Apparatus for Data Collection

For data collection in this probe, two primary tools were employed: the Motor Vehicle Mechanics Work Feat Test (MVMWAT) and a CD-ROM containing 3D computer-animated content aligned with the Motor Vehicle Mechanics Work curriculum. Once the students received training on the 3D computer-animated content, the data collection apparatus was utilized to gather the necessary data.

7.6. Validation of the Apparatus

The apparatus underwent face validation by three experts. The Motor Vehicle Mechanics Work Feat Test was provided to three lecturers for validation to ensure the apparatus's accuracy.

7.7. Reliability of the Apparatus

To assess the reliability of the tool, a pre-test was conducted with fifteen final-year students specializing in motor vehicle repair at a technical institution in Anambra State. These students were at the same academic level as those who later took the probe-designed test, although they were not part of the primary probe group. The internal consistency of the apparatus was calculated using the Kuder-Richardson formula 20 (KR-20). The MVMWAT instrument demonstrated a reliability value of 0.73, indicating its reliability when assessed through the product-moment correlation method.

7.8. Experimental Procedure

The probe encompassed all students who were allocated to control group A. These students underwent a two-week educational program using a 3D computer-animated content CD-ROM after the initial administration of the tool. Subsequently, they were retested as part of post-test group B, and data was collected by retrieving the apparatus from the students.

8. Data Analysis

The analysis of covariance (ANCOVA) was performed to test the null hypotheses at a implication level of 0.05, and mean values were utilized to answer the probe questions. The Statistical Package for Social Science (SPSS) version 22 was deployed to conduct statistical analyses on the gathered data. The computed p-value was deployed to guide the analysis's conclusions. The hypothesis was disproved if the computed value exceeded the p-value. In contrast, the hypothesis was accepted if the estimated value was lower than the p-value. According to the pertinent probe questions and hypotheses,

the data analysis findings were given. At the conclusion of the presentation, a summary of the results was given.

Probe Question 1: How does the use of 3D computer-animated content impact the academic performance of students studying motor vehicle mechanics?

Table 1. *The effect of 3D Computer Animated-content on students' Academic Feat in Motor Vehicle Mechanics Work.*

Group	Test	N	Mean	SD
Control group. A	Pre-test	81	22.71	2.33
Experimental group B 3D Computer Animated-content	Post-test		59.35	2.76

The impact of 3D computer-animated content on students' academic performance in Motor Vehicle Mechanics Works is illustrated in Table 1. The pre-test score had a mean of 22.71, while the post-test score had a mean of 59.35. A comparison of the mean scores reveals that the posttest mean of 59.35 is significantly higher than the pre-test mean of 22.71. This outcome underscores the efficacy of 3D computer-animated content. The inclusion of computer-generated content in the instructional process led to a noticeable improvement in the mean score, in contrast to the pre-test where such content was absent. This underscores the substantial benefits of incorporating 3D computer-animated content in student training.

Hypothesis

The mean academic achievement scores of students instructed with 3D animated content do not exhibit a statistically significant difference when compared to those taught by other means in motor vehicle mechanics work.

Table 2. *Analysis of covariance (ANCOVA) of the difference between the mean academic feat score of students taught motor vehicle mechanics work with 3D computer animated-content.*

Source	Type III sum of square	Df	Mean square	F sig	Partial Eta square
Corrected model	3758.3794	2	1879.190	340.188.000	.815
Intercept	4248.353	1	4298.353	778.128.000	.835
Pre-test	18.157	1	18.157	3.287.072	. 021
Group	3727.786	1	3727.786	674.838.00	.814
Error	850.691	154	5.524		
Total	472957.000	157			
Corrected total	4609.070	156			

R squared = 815 (Adjusted R squared =,823)

An analysis of covariance (ANCOVA) was employed to investigate the variance in mean academic achievement scores among students who received instruction in Motor Vehicle Mechanics Work using 3D computer-animated content. The results yielded an F-value of 674.839 with a significance level of $p < 0.05$. Consequently, the null hypothesis is rejected. This probe provides strong evidence that the utilization of 3D computer-animated multimedia in the teaching of motor vehicle mechanics work had a substantial and positive impact on students' mean academic achievement scores.

Probe Question 2:

What influence does gender (male and female) have on the academic achievement of students learning motor vehicle mechanics with the integration of 3D computer content?

Table 3. *The effects of Gender (Male and Female) on Academic Feat of Students taught Motor Vehicle Mechanics Work with 3D Computer animated content.*

Group	Gender	Test	N	Mean	SD	Mean difference
Control group A	Male	Pre-test	60	22.71	2.07	36.81
		Post-test		59.52	2.80	
3D Computer Animated-content B	Female	Pre-test	21	23.58	3.01	35.21
		Post-test		58.79	2.62	

Table 3 illustrates the impact of gender (male and female) on the academic achievement of students studying Motor Vehicle Mechanics Work with the assistance of 3D computer-animated content. Among the male students in the 3D computer-animated content group (Group A), the pre-test mean score was 22.71, while their female counterparts in the same group had a pre-test mean score of 23.58.

In the 3D computer-animated content group (Group B), male students achieved a mean score of 58.52, and female students in the same group scored a mean of 58.78 after adjusting for their pre-test scores. The mean score difference for male students in the 3D computer-animated content group was 36.81, whereas female students in the same group had a mean score difference of 35.21.

The data reveals that there is very little difference in mean scores between male and female students in both groups, indicating that gender has minimal to no impact on the way students learn Motor Vehicle Mechanics Work from 3D computer-animated material.

Hypothesis 2:

The mean academic achievement scores of male and female students receiving instruction in motor vehicle mechanics with 3D computer animated-content do not demonstrate a statistically significant difference.

Table 4. *Analysis of covariance (ANCOVA) of the difference between mean academic feat scores of male and female students taught motor vehicle mechanics work with 3D computer-animated content.*

Source	Type III sum of square	Df	Mean square	F sig	Partial Eta square
Corrected model	3772.178[a]	4	943.045	171.280.000	.818
Intercept	4130.360	1	4130.360	750.174.000	.832
Pre-test	14.372	1	19.372	3.518.063	.023
Group	2441.948	1	2441.948	443.577.000	.7435
Sex	12.323	1	12.322	2.238.137	.015
Group Sex	.781	1	.781	.142.707	.001
Error	836.892	152	5.506		
Total	472957.000	157			
Corrected total	4609.070	156			

R squared = 818 (Adjusted R squared = 814)

Using 3D computer animation content to teach Motor Vehicle Mechanics Work, male and female students' mean academic feat scores were compared in Table 4 using an analysis of covariance (ANCOVA). According to the findings, F(3, 152) = 0.142, with a p-value higher than 0.05.

Therefore, it is concluded that there is no significant difference in the mean academic accomplishment scores of male and female students who were taught Motor Vehicle Mechanics Work using 3D computer-animated content.

9. Discussion of Findings

The probe findings clearly demonstrate that the utilization of 3D computer-animated content for instructional purposes had a significantly positive impact on the post-test mean scores when

compared between the experimental and control groups. This underscores the effectiveness of the instructional approach in the context of teaching and learning motor vehicle mechanics, and it highlights the superiority of 3D computer-animated content over conventional teaching methods.

A study conducted by supports these results, revealing that animated content, in contrast to traditional approaches, has a more substantial beneficial effect on students' academic achievement in biology [5]. Similarly, as noted, animated content has the potential to enhance knowledge acquisition through the utilization of modern hardware and software styles [22]. One of the advantages of 3D computer-generated content is its ability to offer students a more realistic and immersive way to explore various subjects, events, or objects. Probe suggests that incorporating animated content or video lessons is particularly beneficial when learning necessitates visual representation and motion [17].

10. Conclusion

The probe findings clearly indicate that the implementation of 3D computer-animated content software resulted in a substantial enhancement of the academic performance of technical college students in the field of motor vehicle mechanics in the selected schools. A significant disparity in academic achievement was observed when comparing the control group with the experimental group, thus validating the beneficial impact of the intervention administered to the experimental group. Consequently, it can be inferred that the incorporation of 3D computer-animated content as an instructional tool contributed to improved academic achievements among the students.

Additionally, the probe also unveiled that there was no noteworthy distinction in the levels of cognitive academic achievement between male and female students within the context of motor vehicle mechanics.

Author Contributions

Ohwojero Chamberlain Joseph is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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