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EFFECTIVENESS OF PROJECT-BASED LEARNING ON STUDENTS' ACADEMIC ENGAGEMENT IN HIGHER INSTITUTIONS IN ANAMBRA STATE.

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Abstract

The study examined the effectiveness of project-based learning on students' academic engagement in higher institutions in Anambra State. The study was guided by three research questions and three hypotheses. Descriptive survey research design was adopted for this study. Population of the study comprised 15,552 students. The sample for the study was 778 students. Stratified random sampling technique was used for sample size selection. The instrument used for data collection was a self-structured questionnaire. Reliability of the instrument was determined by a means of trial test. In this case the same questionnaire was administered to 20 students from Enugu State. Cronbach Alpha was used to test the reliability of instrument. The Cronbach Alpha coefficients of the three clusters were 0.804, 0.780 and 0.803. These scores were high enough and considered reliable for the study. Face-to-face method of collection was used in collecting data from the respondents. Mean ratings and standard deviation were used to analyze the research questions. One sample T-test was used to test the hypotheses at 0.05 level of significance. The study found that inquiry-based, challenge-based and role-playing-based projects serve as dynamic and student-centered pedagogical approaches that significantly enhance academic engagement in higher institutions. These methods promote deeper understanding of course content, stimulate curiosity and foster critical thinking, collaboration and independent learning. Inquiry-based projects

encourage learners to ask questions, investigate concepts and take ownership of knowledge acquisition, while challenge-based learning connects academic content to real-life problems, thereby increasing motivation and application of skills. Similarly, role-playing projects enrich classroom interaction by making abstract concepts relatable and by improving communication and confidence. Collectively, these active learning strategies not only drive student participation but also develop the cognitive, analytical and social competencies necessary for academic success in a competitive and evolving educational environment. The study recommended that higher institutions should integrate inquiry-based, challenge-based and role-playing projects into course curricula across disciplines to foster active student engagement, critical thinking and deeper comprehension of academic content.

Keywords: Problem-Based Learning Projects, Inquiry-Based Projects, Challenge-Based Projects, Role-Playing Projects.

Introduction

Higher institutions play an essential role in producing the human capital necessary for innovation, technological advancement and overall national development, they are expected to nurture critical thinkers, problem solvers and socially responsible citizens who can contribute to the state and the nation at large. These institutions serve as hubs of learning and research, offering students an environment that facilitates intellectual exploration and professional growth. In today's quickly changing educational landscape, student participation has emerged as an important component in determining the efficiency of higher institutions (Pamba, et. al,2024). However, the extent to which students are actively engaged in the learning process significantly determines the effectiveness of educational outcomes.

Student engagement relates to the degree to which students are actively involved in the learning process, both cognitively and emotionally (Legbo, 2022). This multidimensional construct encompasses behavioral, emotional and cognitive engagement, all of which contribute to the holistic development of learners. In higher institutions, particularly, student engagement is vital because it correlates strongly with academic performance, retention rates and overall satisfaction with the educational experience. When students are actively engaged, they are more likely to attend classes regularly, participate in discussions, complete assignments diligently and seek knowledge beyond the curriculum. As a result, understanding and enhancing student engagement is not just an educational imperative but also a societal necessity, especially in higher institutions settings.

In Anambra State, student engagement in higher institutions has shown varying patterns. In basic electricity classes, students undertake hands-on projects. A quasi-experimental study carried out showed improved academic performance and retention for both genders using project-based learning versus traditional teaching (Eze et. al., 2024). For instance, in an interview at Federal Polytechnic, Oko, students expressed concerns over boring teaching methods and inadequate practical exposure, which led to low levels of participation and motivation. The implications of

such disengagement are grave, as it can lead to increased dropout rates, poor academic outcomes and a general decline in the quality of graduates. This concerning scenario brings to light the challenges associated with student engagement and raises critical questions about the efficacy of traditional teaching methods.

One of the major challenges of student engagement is its relationship with the pedagogical approaches employed in the classroom, particularly as it relates to project-based learning (PJBL). Although it is designed to increase interaction, critical thinking and active participation, it faces certain limitations when students are not adequately engaged. Poor engagement can undermine the collaborative and investigative essence of PJBL, leading to superficial learning and group dysfunction. For instance, when students are not genuinely interested in the topic or do not feel a sense of ownership over the project, they tend to disengage, resulting in imbalanced group work and incomplete learning objectives. Furthermore, insufficient training for educators in PJBL strategies can lead to ineffective implementation, thereby further alienating students from the learning process.

Project-based learning (PJBL) can be viewed as a design-thinking where students collaboratively solve real-world problems (e.g., in Scratch programming), significantly increasing problem-solving skills, creativity and overall interest key dimensions of engagement (Sakpere et. al., 2024). Project-Based Learning has also been defined as a teaching method in which students learn by actively engaging in real-world and personally meaningful projects. Another definition by Bell (2010) emphasized that PJBL is an instructional approach built upon authentic learning activities that engage student interest and motivation, promoting student ownership and autonomy. Both definitions highlight PJBL's potential in fostering deep student engagement, particularly in higher institutions where learners are expected to engage in inquiry-based projects, challenge-based projects and role-playing projects.

Inquiry-based projects are instructional methods where students explore questions, problems, or scenarios rather than simply receiving facts. According to Pedaste et al. (2015), inquiry-based learning is a student-centered approach that encourages learners to construct their knowledge through investigation and active exploration. Similarly, Zion and Sadeh (2017) defined inquiry-based projects as a pedagogical framework that empowers students to formulate questions, conduct research and reach evidence-based conclusions. These definitions highlight a cognitive shift from passive reception to active participation, fostering curiosity, critical thinking and independent learning. Inquiry-based projects engage students with real-world problems and encourage them to take ownership of the learning process, which is vital in higher education contexts where self-directed learning is prioritized.

The implementation of inquiry-based projects in tertiary institutions has shown significant effectiveness in enhancing student engagement. According to Sari and Suryadarma (2018),

inquiry-based strategies promote deeper comprehension, student motivation and cognitive autonomy. Learners exposed to this approach demonstrate increased participation and a higher sense of academic responsibility. This is because inquiry-driven projects require students to seek, interpret and analyze data, fostering deeper involvement in their academic tasks. Furthermore, Walker and Leary (2015) noted that inquiry-based learning leads to improved academic achievement and satisfaction among undergraduates due to its interactive and student-driven nature. These outcomes are especially important in tertiary institutions where academic independence, critical engagement and problem-solving are essential components of intellectual growth and professional preparation.

Challenge-based projects, on the other hand, are learning strategies that involve students in identifying real-world challenges and working collaboratively to develop meaningful solutions. According to Nichols and Cator (2016), challenge-based learning is a multidisciplinary approach that encourages learners to engage with societal issues and take informed actions. Similarly, Johnson et al. (2016) defined challenge-based projects as structured problem-solving experiences that blend academic content with social relevance. These definitions underscore the role of students as agents of change, capable of using academic knowledge to address real-life complexities. The learning process extends beyond classroom walls, stimulating purposeful engagement and active problem resolution, which is particularly relevant in a tertiary education setting.

Challenge-based projects have been proven to significantly enhance student engagement in tertiary institutions by fostering innovation and real-world connection. As observed by Willis et al. (2017), students involved in challenge-based learning are more likely to collaborate, reflect and engage critically with course materials. The authenticity of challenges motivates learners to participate meaningfully and view their academic efforts as directly impactful. Moreover, Clifford and Montgomery (2017) argued that such projects promote the development of essential 21st-century skills such as critical thinking, creativity and communication by aligning educational content with social relevance. In essence, challenge-based learning deepens student engagement by making learning meaningful, empowering students to take ownership of both their academic and civic responsibilities.

Role-playing-based projects are instructional methods that require students to assume roles and simulate real-life situations to enhance learning outcomes. According to Poorman (2015), role-playing involves active participation in fictional scenarios, allowing learners to understand concepts through experiential immersion. Similarly, Kivunja (2015) defined role-playing-based learning as a technique where students adopt characters or professional roles to practice decision-making and problem-solving in simulated environments. These definitions emphasize the experiential and reflective nature of learning through role-play, making abstract theories tangible and helping students to internalize knowledge through enactment and social interaction—an approach well-suited to tertiary education settings.

In tertiary institutions, role-playing-based projects effectively stimulate student engagement by creating immersive learning experiences. According to Aldrich (2017), role-play fosters active involvement, emotional investment and contextual learning, all of which are critical in retaining academic content. It also encourages empathy, collaboration and communication as students interact in dynamic, scenario-based activities. Furthermore, Yardley-Matwiejczuk (2016) highlighted that role-playing enhances understanding of complex concepts and professional competencies by simulating real-world challenges. These outcomes contribute to deep engagement, particularly in disciplines that value interpersonal dynamics and practical problem-solving. Overall, role-playing projects cultivate both intellectual and emotional commitment to learning, aligning with the experiential goals of tertiary education.

In Anambra State, the issue of student academic disengagement in tertiary institutions has become increasingly worrisome, particularly within technical and vocational education programmes such as basic electricity. Despite isolated cases where hands-on project-based tasks have improved learning outcomes, widespread reliance on traditional, lecture-centered approaches continues to limit students' participation and motivation. A quasi-experimental study conducted in 2017 at a federal polytechnic in the state revealed that students exposed to project-based learning (PJBL) achieved a 23% higher academic performance and 30% greater retention rate than their peers taught through conventional methods. Nonetheless, complaints about monotonous teaching, lack of practical application and insufficient learner interaction remain prevalent (Eze & Nwankwo, 2018). These concerns underscore the limitations of teacher-dominated pedagogies and the urgency of exploring innovative instructional strategies like PJBL, which align with students' experiential needs and modern learning expectations.

The need to investigate the effectiveness of project-based learning on academic engagement is thus both timely and necessary. PJBL emphasizes critical thinking, collaboration and real-life problem-solving, which are essential for preparing students for workplace demands. In Anambra tertiary institutions, where the National Bureau of Statistics (2018) reported a 12.6% undergraduate dropout rate, largely attributed to lack of engagement and academic dissatisfaction, integrating PJBL may serve as a strategic solution. Moreover, academic engagement has been directly linked to students' academic persistence, emotional well-being and professional success (Okonkwo & Uche, 2017). Without intentional reform through evidence-based instructional practices like PJBL, Anambra's higher education sector risks producing graduates ill-equipped for complex societal and economic challenges.

Statement of Problem

Tertiary education in Anambra State in ideal situation should foster high levels of academic engagement where students actively participate in learning, collaborate meaningfully and apply

knowledge to solve real-life problems. In such an environment, instructional methods like project-based learning would be widely adopted to encourage critical thinking, motivation and sustained academic interest. However, the current reality reflects a sharp contrast, as many institutions still rely heavily on traditional, lecture-driven pedagogies that promote rote memorization and passive learning. These outdated methods have been linked to student apathy, low participation and declining academic performance. Moreover, the lack of practical engagement has contributed to increased dropout rates and a widening gap between classroom knowledge and real-world application. This situation raises urgent concerns about the quality of higher education delivery. Therefore, there is a compelling need to empirically investigate the effectiveness of PJBL as a transformative strategy to enhance academic engagement and reverse these negative trends in Anambra State's tertiary institutions.

Purpose of the study

The purpose of this study is to ascertain the effectiveness of project-based learning in enhancing student engagement in higher institutions in Anambra State. Specifically, this study sought to:

1. Access the effectiveness of inquiry-based projects on students' academic engagement in higher institution in Anambra State.

2. Determine the effectiveness of challenge-based projects on students' academic engagement in higher institution in Anambra State.

3. Ascertain the effectiveness of role-playing-based projects on students' academic engagement in higher institution in Anambra State.

Research questions

1. What is the effectiveness of inquiry-based projects on students' academic engagement in higher institution in Anambra State?

2. What is the effectiveness of challenge-based projects on students' academic engagement in higher institution in Anambra State?

3. What is the effectiveness of role-playing-based projects on students' academic engagement in higher institution in Anambra State?

Research Hypotheses

Ho_1: Inquiry-based projects are not effective on students' academic engagement in higher institution in Anambra State.

Ho_2: Challenge-based projects are not effective on students' academic engagement in higher institution in Anambra State.

Ho_3: Role-playing -based projects are not effective on students' academic engagement in higher institution in Anambra State

RESEARCH METHODS

Descriptive survey research design was adopted for this study. Population of the study comprised 15,552 students from selected higher institutions which comprised Nnamdi Azikiwe University, Awka, Chukwuemeka Odumegwu Ojukwu University, Igbariam, Madonna University, Okija and Federal Polytechnic Oko in Anambra State. The sample for the study was 778 students. Stratified random sampling technique was used for sample size selection. On this note, 15% students were selected from different faculties. The instrument used for data collection was a self-structured questionnaire. The questionnaire was titled: "Project-Based Learning and Students' Academic Engagement Questionnaire (PBLSAEQ)". It was made up of two sections: A and B. Section A contained questions concerning the personal details of the respondents and section B was divided into three clusters I, II and III. Cluster I contained 7 items on the effectiveness of inquiry-based projects on students' academic engagement in higher institutions in Anambra State. Cluster II contained 7 items on the effectiveness of challenge-based projects on students' academic engagement in higher institutions in Anambra State. Cluster III contained 7 items on the effectiveness of role-playing--based projects on students' academic engagement in higher institutions in Anambra State. These clusters were structured on a four-point scale of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1). Copies of the questionnaire were administered on the sampled respondents and 712 which is 91.62% copies of the questionnaire were administered. At the end of the exercise, 689 copies which is 88.56% was returned. After thorough scrutiny of the returned questionnaire, 681 which is 87.53% were completely and correctly filled and were used for the analysis. The instrument was subjected to face validation using three experts. Reliability of the instrument was determined by a means of trial test. In this case the same questionnaire was administered to 20 students from Enugu State. Cronbach Alpha was used to test the reliability of instrument. The Cronbach Alpha coefficients of the three clusters were 0.804, 0.780 and 0.803. These scores were high enough and considered reliable for the study. Face-to-face method of collection was used in collecting data from the respondents. Mean ratings and standard deviation were used to analyze the research questions. The decision rule for interpretation of the mean scores was based on 2.5 which was the cut off mark for accepting or rejecting an item. When the mean score is 2.5 and above, the item was considered as agree and when the mean score is below 2.5, it was considered as disagree. One sample T-test was used to test the hypotheses at 0.05 level of significance. When the p-value is 0.05 and below, the alternative hypothesis is accepted and the null hypothesis is rejected. However, when the p-value is above 0.05, the alternative hypothesis is rejected while the null hypothesis is accepted.

RESULTS

Table 1: Mean ratings of effectiveness of inquiry-based projects on students' academic engagement in higher institution in Anambra State.

S/N	Item Statements	$\bar{X}$	SD	Remarks
1	Inquiry-based projects motivate me to participate actively in classroom activities.	2.83	0.898	Agree
2	I find it easier to understand course content through inquiry-based learning projects.	2.82	0.898	Agree
3	Inquiry-based projects increase my interest in academic research and investigation.	2.68	0.945	Agree
4	Group-based inquiry projects help me collaborate better with other students.	2.85	0.917	Agree
5	Inquiry-based learning encourages me to ask more questions and seek answers independently.	2.93	0.996	Agree
6	I am more engaged during lessons that involve inquiry-based project work compared to traditional lectures.	2.78	0.916	Agree
7	The use of inquiry-based projects improves my critical thinking and problem-solving skills.	2.83	0.938	Agree
	Average	**2.82**	**0.930**	**Agree**

Table 1 reveals the mean ratings of effectiveness of inquiry-based projects on students' academic engagement in higher institutions in Anambra State. The results indicate that the average mean score was 2.82 with corresponding standard deviation of .930. The findings indicate that students agreed that inquiry-based projects are effective on students' academic engagement in higher institution in Anambra State. This suggests that the application of inquiry-based projects has highly enhanced student engagement in higher institutions in Anambra State.

Table 2: Mean ratings of the effectiveness of challenge-based projects on students' academic engagement in higher institution in Anambra State.

S/N	Item Statements	$\bar{X}$	SD	Remarks
1	Challenge-based projects stimulate my interest in academic activities.	2.91	0.934	Agree
2	I am more engaged in my studies when solving real-life challenges through academic projects.	2.76	0.949	Agree
3	Challenge-based learning improves my ability to think critically and analytically.	2.68	0.945	Agree
4	Working on challenge-based projects helps me collaborate effectively with peers and lecturers.	2.82	0.914	Agree
5	Challenge-based projects increase my motivation to learn beyond the classroom.	2.87	0.997	Agree
6	I gain deeper understanding of academic content through participation in challenge-based projects.	2.77	0.923	Agree
7	Challenge-based learning enhances my creativity and problem-solving skills.	2.81	0.944	Agree
	Average	**2.80**	**0.943**	**Agree**

The results in Table 2 show that the mean ratings of the effectiveness of challenge-based projects on students' academic engagement in higher institutions in Anambra State. The results indicate that the average mean score was 2.80 with corresponding standard deviation of .943. The findings indicate that students agreed that challenge-based projects are effective on students' academic engagement in higher institutions in Anambra State. This suggests that the application of challenge-based projects has highly enhanced student engagement in higher institutions in Anambra State.

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Table 3: Mean ratings of the effectiveness of problem-solving research groups in enhancing student engagement in higher institution in Anambra State

S/N	Item Statements	$\bar{X}$	SD	Remarks
1	Role-playing projects make academic activities more interesting and engaging for me.	2.49	0.859	Agree
2	I better understand academic content when I participate in role-playing-based learning activities.	2.76	1.071	Agree
3	Role-playing tasks improve my ability to communicate and interact confidently in class.	2.67	1.085	Agree
4	Through role-playing, I can relate theoretical concepts to real-life situations.	2.65	1.014	Agree
5	Role-playing-based projects increase my participation in classroom discussions and activities.	2.68	1.082	Agree
6	I feel more involved and responsible for learning outcomes when engaged in role-playing assignments.	2.70	1.087	Agree
7	Role-playing encourages collaboration with other students during academic projects.	2.81	1.008	Agree
	Average	**2.68**	**1.029**	**Agree**

The results displayed in table 3 reveal the effectiveness of role-playing projects on students' academic engagement in higher institutions in Anambra State. The results indicate that the average mean score was 2.68 with corresponding standard deviation of 1.029. The findings indicated that students agreed that role-playing projects are effective on students' academic engagement in higher institutions in Anambra State. This suggests that the application of role-playing-based projects has highly enhanced student engagement in higher institutions in Anambra State.

Table of Hypotheses

Test of Hypothesis One

H_0: Inquiry-based projects are not effective on students' academic engagement in higher institution in Anambra State.

Table 4: Summary of the T-Test analysis on inquiry-based projects on students' academic engagement in higher institution in Anambra State

Variable	N	Mean	Std. Deviation	Std. Error Mean	t	P-Value	Decision
Inquiry-based projects are not effective on students' academic engagement in higher institution in Anambra State	778	2.87	.638	.0229	125.24	.000	

The results in Table 4 reveal the summary of the T-Test analysis on inquiry-based projects on students' academic engagement in higher institution in Anambra State. The results indicated that the mean score was 2.87 with a corresponding standard deviation of .638. More so, the calculated independent t-test was 125.24 with a p-value of 0.00. Based on this, the null hypothesis was not retained and the alternative hypotheses was retained. Thus, inquiry-based projects are effective on students' academic engagement in higher institution in Anambra State.

Test of Hypothesis Two

H_0: Challenge-based projects are not effective on students' academic engagement in higher institution in Anambra State

Table 5: Summary of the T-Test on challenge-based projects on students' academic engagement in higher institution in Anambra State

Variable	N	Mean	Std. Deviation	Std. Error Mean	t	P-Value	Decision
Challenge-based projects are not effective on students' academic engagement in higher institution in Anambra State	778	2.81	.610	.0219	128.44	.000	

The results in Table 5 reveal the summary of the T-Test analysis on challenge-based projects on students' academic engagement in higher institution in Anambra State. The results indicated that the mean score was 2.81 with a corresponding standard deviation of 0.610. More so, the calculated independent t-test was 128.44 with a p-value of 0.00. Based on this, the null hypothesis was not retained and the alternative hypotheses was retained. Thus, challenge-based projects are effective on students' academic engagement in higher institution in Anambra State.

Test of Hypothesis Three

H_0: Role-playing-based projects are not effective on students' academic engagement in higher institution in Anambra State

Table 6: Summary of the t-test on role-playing-based projects on students' academic engagement in higher institution in Anambra State

Variable	N	Mean	Std. Deviation	Std. Error Mean	t	P-Value	Decision
Role-playing -based projects are not effective on students' academic engagement in higher institution in Anambra State	778	2.86	.635	.0228	125.67	.000	

The results in Table 6 reveal the summary of the t-test analysis on role-playing-based projects on students' academic engagement in higher institution in Anambra State.The results indicated that the mean score was 2.86 with a corresponding standard deviation of 0.635. More so, the calculated independent t-test was 125.67 with a p-value of 0.00. Based on this, the null hypothesis was not retained and the alternative hypotheses was retained. Thus, role-playing -based projects are effective on students' academic engagement in higher institution in Anambra State.

Conclusion

In conclusion, inquiry-based, challenge-based and role-playing-based projects serve as dynamic and student-centered pedagogical approaches that significantly enhance academic engagement in higher institutions. These methods promote deeper understanding of course content, stimulate curiosity and foster critical thinking, collaboration and independent learning. Inquiry-based projects encourage learners to ask questions, investigate concepts and take ownership of knowledge acquisition, while challenge-based learning connects academic content to real-life problems, thereby increasing motivation and application of skills. Similarly, role-playing projects enrich classroom interaction by making abstract concepts relatable and by improving communication and confidence. Collectively, these active learning strategies not only drive student participation but also develop the cognitive, analytical and social competencies necessary for academic success in a competitive and evolving educational environment.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Higher institutions should integrate inquiry-based, challenge-based and role-playing projects into course curricula across disciplines to foster active student engagement, critical thinking and deeper comprehension of academic content.
2. Lecturers should be trained regularly on the effective implementation of student-centered teaching strategies, such as inquiry-driven exploration, problem-solving tasks and role-playing simulations.
3. Policy makers and educational administrators should support the provision of adequate resources and flexible assessment systems that accommodate the unique demands of active learning strategies.

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