PRIVATE COST OF EDUCATION AMONG ENGINEERING UNDERGRADUATE STUDENTS IN UNIVERSITY OF BENIN, BENIN CITY, EDO STATE

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Abstract

This study examined the private cost of education among engineering undergraduate students at the University of Benin, Benin City, Edo State, Nigeria. A descriptive survey research design was adopted. The study population comprised undergraduate engineering students from seven departments in the Faculty of Engineering, from which a sample of 400 students was selected through stratified random sampling. Data were collected using a validated instrument titled *Private Cost of Education Questionnaire for Engineering Students (PCEQES)* with a reliability coefficient of 0.82, and analyzed using descriptive statistics, independent t-test, one-way ANOVA, and Pearson Product Moment Correlation at a 0.05 level of significance. Findings revealed that accommodation (Mean = 3.52) and feeding (Mean = 3.47) were the most significant cost components. A statistically significant difference was observed in academic engagement between male (M = 62.45) and female students (M = 58.17), with private costs affecting female students more negatively ($t = 3.411$, $p = 0.001$). Significant variation in private educational costs existed across engineering departments ($F = 5.328$, $p = 0.000$), with resource-intensive departments incurring higher expenses. A moderate positive correlation was found between high private educational costs and dropout intentions ($r = 0.456$, $p = 0.000$). The study concludes that financial burden significantly impacts engineering students' academic experiences, with notable gender disparities and departmental variations. It recommended implementing gender-responsive support schemes, department-specific financial aid programs, expanded scholarship initiatives, and flexible payment policies to reduce financial stress and improve student retention in engineering programs.

Keywords: Private educational costs, engineering students, academic engagement, gender disparities, dropout intentions, University of Benin.

Introduction

Engineering Education in universities is an essential investment that every developing and developed nations use to develop her technological and economic scope which affords to improve its learning through schools. The progress of any nation is built on the importance of engineering education in university. It equips students with the scientific knowledge, practical skills, and problem-solving abilities needed to design, innovate, and sustain modern industries (UNESCO, 2020). Through university-based engineering programs, societies are able to cultivate professionals who drive progress in sectors such as infrastructure, manufacturing, energy, communication, and transportation. In developing nations, engineering education provides a pathway to self-reliance by reducing dependence on foreign technology, while in

advanced economies, it ensures continuous innovation and competitiveness in the global market (World Bank, 2022).

Engineering Education is the process of teaching the skills, knowledge, values, and principles related to the professional practice of engineering. Danko (2006) viewed Engineering Education as the type of education through which students learn the processes and knowledge essential to engineering practice. The UNESCO Report (2010) defined Engineering Education as a field or discipline that involves the development, acquisition, and application of technical, scientific, and motivational knowledge necessary for the design, invention, innovation, and use of materials, machines, structures, systems, and processes for specific purposes. Engineering education, therefore, serves as a catalyst for technological and economic development, social cohesion, and political stability by equipping individuals with the competencies needed to contribute meaningfully to society (Kiiashko, 2022).

A critical component of Engineering Education is the private cost of education, which forms an integral part of human capital investment. The concept of private cost is rooted in the Human Capital Theory (Becker, 1964), which posits that expenditure on education is an investment that yields future economic and social returns. Private costs of education refer to all expenses borne by students and their families, including tuition, accommodation, transportation, textbooks, and living expenses (Oyetakin, 2016). While public universities in Nigeria are subsidized by government funding, students still incur significant private costs that affect their academic engagement and performance. Akaa (2025) described the private cost of education as a proactive measure to forestall inefficiency in higher institutions, while Obanor and Ogbeide (2021) noted that these costs are often viewed as personal investments by students and their families.

Examining the private costs of education is crucial because it shapes students' academic experiences, engagement, and overall outcomes. High private costs often lead to psychological stress, limited participation in learning activities, and in some cases, premature withdrawal from school. According to Tiamiyu (2020), engineering students face additional financial burdens because of the specialized tools, laboratory materials, and technical resources required for their programs. Private educational costs go beyond tuition fees and include other hidden or indirect expenses such as laboratory materials, safety gear, textbooks, transportation, and daily sustenance. Engineering students, in particular, often encounter higher expenses because of the practical and technical nature of their courses. For instance, students at the Federal University Otuoke in Bayelsa State pay ₦106,000 in tuition for engineering courses, in addition to costs associated with accommodation, equipment, and project work (Oyetakin & Adeosun, 2014).

Gender also plays an important role in shaping both private educational costs and academic engagement. Research indicates that female students often face higher costs because of additional personal and safety needs, as well as societal expectations (Giwa & Sheu, 2022). Cultural and economic factors in some regions also limit women's access to financial support, making them more vulnerable to dropout risks. This gender dimension introduces another layer of complexity to understanding how private educational costs influence students' engagement in engineering programs, where women are already underrepresented.

Differences in private educational costs also exist among engineering disciplines. Civil engineering students, for example, may require construction materials for practical projects,

while electrical and mechanical engineering students often need costly electronic and mechanical components for design work. These variations can influence how students allocate time, energy, and resources to their studies (Nwabueze & Egenti, 2020). When these financial demands are not adequately met, students may experience reduced motivation, absenteeism, or lower engagement in hands-on activities, which are crucial in engineering education.

The issue of high private educational costs has broader implications for student engagement and retention. Studies show that financial strain is one of the leading causes of low academic motivation and increased dropout rates in Nigerian universities (Nwabueze & Egenti, 2020). Students who struggle to meet their private costs may engage less actively in academic and extracurricular activities, leading to poor learning outcomes (Kroth, 2023).

From a theoretical standpoint, this study draws upon Cost–Benefit Analysis Theory, which assumes that students weigh the expected future returns of education against its present financial costs. In this context, students' willingness and ability to engage academically are partly influenced by their perceptions of educational value relative to their investment. If the perceived cost outweighs the potential benefits especially in a challenging field like engineering students may exhibit reduced engagement or even abandon their programs (Matsolo *et al*., 2022). Despite the growing literature on higher education financing, there remains a research gap regarding how private educational costs specifically affect the academic engagement of engineering students in Nigerian universities.

Statement of the Problem

Despite government subsidies, students in Nigerian public universities, especially those from low-income backgrounds, continue to bear significant private educational costs. These include expenses for accommodation, transportation, feeding, learning materials, and departmental charges, which place a heavy financial burden on them. Many students struggle to afford essential academic items such as textbooks, internet data, laboratory kits, and protective equipment, leading to financial stress, low academic engagement, and poor performance. In extreme cases, students are forced to skip lectures, take up part-time jobs, or even drop out due to their inability to meet these financial demands, threatening the country's goal of producing a skilled and educated workforce.

Observations from the University of Benin reveal that engineering students, in particular, face high hidden costs related to technical equipment and materials needed for practicals and projects. Delays in project completion and dissatisfaction among students highlight the urgency of addressing this issue. Although some studies such as Mwangi and Githinji (2021); and Giwa and Sheu, (2022) have examined educational expenses, few have focused on the unique financial challenges within technical programs like engineering. There is also a lack of recent, gender-sensitive data detailing how private costs vary across engineering departments and how they impact students' academic participation and dropout intentions. This study seeks to fill that gap by examining the financial pressures faced by engineering undergraduates at the University of Benin.

Objectives of the Study

The general objective of this study is to examine Private Cost of Education among Engineering Undergraduate Students in University of Benin, Benin City, Edo State. Specifically, the study seeks to:

1. Identify the major components of private educational costs borne by engineering students in the University of Benin.
2. Investigate the influence of private educational costs on students' academic engagement and participation based on gender
3. Assess the variation in private educational costs across different engineering departments (e.g., civil, mechanical, electrical).
4. Assess if there is any relationship between high private educational cost and dropout intentions among engineering students

Research Questions

1. What are the major components of private educational costs incurred by engineering students at the University of Benin?
2. How do private educational costs affect students' academic engagement and participation based on gender?
3. Is there a variation in private educational costs across different engineering departments?
4. Is there any relationship between high private educational cost and dropout intentions among engineering students?

Hypotheses

Ho_1: There is no significant difference between private educational costs and academic engagement of engineering male and female students.
Ho_2: There is no significant variation in private educational costs across different engineering departments.
Ho_3: There is no significant relationship between high private educational cost and dropout intentions among engineering students.

Review of Related Literature

Several empirical studies have examined private cost of education among undergraduate students across the globe. These studies explored various dimensions such as cost components, gender-based engagement, departmental variations, and dropout intentions, providing valuable insights and identifying gaps for further investigation. Ogundele and Adegoke (2021) investigated the main components of private educational costs incurred by undergraduate students in public universities within Delta State. Using a descriptive survey design, they sampled 450 students across three major universities. The study employed structured questionnaires and interviews to gather data on housing, feeding, transportation, learning materials, and personal security. Findings revealed that accommodation and transportation accounted for over 50% of total private educational costs, while feeding and learning materials closely followed. The study was geographically limited to Delta State and did not assess how these costs vary across academic departments or relate to academic performance. Oyetakin, (2018) investigated the private cost and efficiency of postgraduate students in six public

universities in Southwest Nigeria from 2012 to 2017. Using a descriptive survey design and a validated questionnaire (reliability = 0.81), data were collected from 300 postgraduate students across various disciplines. Findings revealed that science students incurred the highest private costs (₦453,766.23), followed by engineering (₦429,901.22), while arts recorded the lowest (₦287,304.30). Despite these differences, there was no significant relationship between private cost and student efficiency ($r = -0.0627$, $p > 0.05$), although a significant difference in private costs across disciplines was observed ($F(5,30) = 8.55$, $p < 0.05$). The study concluded that private costs alone do not determine postgraduate efficiency, as factors like strikes, discipline, and institutional challenges play key roles.

Eze and Ibeh (2022) explored the gender-specific effects of private educational costs on students' academic engagement in public universities in southeastern Nigeria. The study sampled 400 students (200 males, 200 females) across four faculties in two universities. Using a comparative design and regression analysis, the study found that female students reported higher costs for transportation and personal security, which negatively impacted class attendance. In contrast, male students experienced more financial pressure from gadget acquisition and feeding. The study lacked a longitudinal perspective to assess how these differences evolve over time and did not consider the role of institutional interventions. Giwa and Sheu, (2022) examined the factors influencing the private cost of university education in southwestern Nigeria. The study employed a descriptive survey approach using an ex-post facto design, as the variables under investigation had already occurred and could not be manipulated by the researcher. The study focused on observing and describing existing conditions. A stratified random sampling method was used to select 2,212 participants, and data were gathered using an instrument titled "Private Cost of Teacher Education Inventory (PCTEI)." The data were analyzed through z-test statistics and regression analysis. The findings showed that private educational costs varied significantly based on factors such as institutional ownership, gender, housing arrangement, and the type of institution. However, the field of study did not have a substantial impact on the private cost of education.

Mwangi and Githinji (2021) explored cost differentials in engineering departments at two public universities in Kenya. The study involved 300 students from civil, mechanical, and electrical engineering programs. They used cost-tracking diaries and student expenditure surveys to determine cost variations. Mechanical engineering students incurred higher expenses due to workshop projects, while civil engineering students spent more on transportation to construction sites. The study did not evaluate whether these costs affected academic outcomes or whether any cost-support measures were in place. Nwachukwu and Etim (2019) conducted a study on how high private educational costs influence dropout intentions among undergraduates. Using a sample of 600 students from two universities in south-south Nigeria, the researchers used binary logistic regression to analyze the effect of costs on dropout probability. They found that over 38% of respondents had considered dropping out due to financial stress, especially in securing accommodation and feeding. Nyarko and Adomako (2020) examined how private educational costs affect dropout intentions in Ghana. A sample of 400 students across two Ghanaian public universities was studied using a mixed-methods approach. Results showed that students facing high costs in rent, books, and transport were more likely to skip classes or withdraw temporarily. This was especially the case for students from rural areas studying in urban campuses. The study provided rich qualitative insights but lacked departmental-level cost analysis and did not assess long-term educational consequences of dropouts.

Methodology

This research study examined the private educational costs experienced by engineering students at the University of Benin using a descriptive survey research design. The study focused on understanding the extra money that engineering students and their families spend on education beyond official school fees, including costs for accommodation, transportation, textbooks, equipment, and other materials. The descriptive survey was adopted for this study. The descriptive survey approach was chosen because it allows researchers to collect and describe real-life data about students' experiences without manipulating any variables, providing a clear picture of the current situation regarding educational expenses faced by engineering students.

The study population consisted of all undergraduate engineering students in the Faculty of Engineering at the University of Benin, which includes seven departments: Civil Engineering, Mechanical Engineering, Electrical/Electronic Engineering, Computer Engineering, Petroleum Engineering, Chemical Engineering, and Production Engineering with a total population of one thousand, four hundred and eighteen (1418). A sample size of a total of 400 students were selected which is 28% of the total population. The choice of 28% as the sample size was considered adequate to provide a reliable representation of the entire population while remaining manageable for data collection and analysis. The study employed a stratified random sampling technique to select participants from the population of 1,418 undergraduate engineering students in the Faculty of Engineering at the University of Benin. Each department was treated as a separate stratum to ensure that students from all engineering disciplines were fairly represented in the sample. Within each department, students were further categorized according to their academic levels (100–500 level) and gender to enhance inclusiveness and diversity. Stratified random sampling was chosen because it minimizes sampling bias and increases the representativeness of the sample.

Data collection was carried out using a structured questionnaire called "Private Cost of Education Questionnaire for Engineering Students (PCEQES)" which was divided into five sections covering demographic information, major components of private educational costs, influence of costs on academic engagement, cost variations across departments, and the relationship between private costs and dropout intentions. The questionnaire's validity was ensured through expert review by three specialists in Educational Measurement and Evaluation and one senior engineering lecturer, while reliability was confirmed through a pilot test involving 30 engineering students from another federal university, yielding a Cronbach Alpha coefficient of $r = 0.82$. The questionnaire was administered in person by the researcher and trained assistants over a three-week period, with participants assured of confidentiality and voluntary participation.

The collected data were analyzed using SPSS Version 25 with various statistical methods including descriptive statistics for identifying major cost components, independent ttest for examining gender-based cost differences, one-way ANOVA for assessing cost variations across departments, and Pearson Product Moment Correlation for determining the relationship between high educational costs and dropout intentions. All hypotheses were tested at 0.05 significance level.

Results

Research Question One

What are the major components of private educational costs incurred by engineering students at the University of Benin?

Table 1: Mean and Standard Deviation of Major Components of Private Educational Costs (N = 400)

Cost Components	Mean	Standard Deviation	Decision
Accommodation	3.52	0.61	Agree
Feeding	3.47	0.66	Agree
Transportation	3.35	0.72	Agree
Textbooks and Handouts	3.21	0.70	Agree
Departmental/Faculty Charges	2.96	0.74	Agree
Practical Kits/Materials	3.38	0.63	Agree
Internet & Data Subscription	3.10	0.68	Agree
Personal Protective Equipment	2.89	0.79	Agree
Software Licenses/ICT Tools	2.45	0.84	Disagree

The findings show that engineering students at the University of Benin consider accommodation, feeding, transportation, textbooks, and practical materials as major private educational costs, with accommodation (Mean = 3.52) and feeding (Mean = 3.47) being the most significant. Only software licenses/ICT tools (Mean = 2.45) fell below the decision threshold, suggesting they are seen as less essential or department-specific. This implies that financial support programs should prioritize high-burden areas like housing, feeding, and learning materials, while software-related support can be tailored to specific departmental needs.

Hypothesis One: There is no significant difference between private educational costs and academic engagement of engineering male and female students.

Table 2: Independent Samples t-test Showing Gender Differences in Academic Engagement Based on Private Educational Cost

Gender	N	Mean Academic Engagement	Std. Deviation	t-value	df	Sig. (2-tailed)
Male	290	62.45	10.23	3.411	398	0.001
Female	110	58.17	9.84			

The mean academic engagement score for male students is 62.45, and for female students**,** it's 58.17. The t-value is 3.411 with 398 degrees of freedom and a p-value of 0.001 (less than 0.05), indicating that there is a statistically significant difference in academic engagement based on gender, as influenced by private educational costs. This result suggests that female students are more affected by private educational costs, potentially due to additional social or personal expenditures. This result emphasizes the need for gender-responsive policies and interventions that can alleviate financial stress for female students in engineering programs.

Hypothesis Two: There is no significant variation in private educational costs across different engineering departments

Table 3: One-Way ANOVA Showing Variation in Private Educational Costs Across Engineering Departments

Source of Variation	Sum of Squares	df	Mean Square	F-value	Sig.
Between Groups	13452.67	6	2242.11	5.328	0.000
Within Groups	165288.91	393	420.55		
Total	178741.58	399			

The ANOVA test result reveals an F-value of 5.328 and a significant p-value of 0.000, which is less than 0.05. This indicates that there is a significant variation in private educational costs among students in different engineering departments. This suggests that not all engineering departments have the same cost structure**.** Departments like Mechanical or Electrical Engineering may require more expensive tools, lab materials, or software. The implication is that financial aid and support policies must be department-specific**,** not one-size-fits-all.

Hypothesis Three: There is no significant relationship between high private educational cost and dropout intentions among engineering students.

Table 4: Correlation Between Private Educational Cost and Dropout Intentions

Variables	N	Mean	Std. Dev	r-value	Sig. (2-tailed)
Private Educational Cost	400	71.82	12.30	0.456	0.000
Dropout Intentions		45.27	11.68		

The Pearson correlation coefficient is 0.456**,** indicating a moderate positive relationship**,** and the p-value of 0.000 shows that the result is statistically significant. This means students who face higher private educational costs are more likely to consider dropping out of school. This finding reveals that financial burden is a key predictor of dropout intentions**.** University management should consider introducing more scholarships, flexible payment plans, or cost-sharing schemes to reduce dropout rates and improve retention among engineering students.

Discussion of Findings

The first hypothesis tested whether there was a significant difference between male and female students in their level of academic engagement. The independent samples t-test result showed a statistically significant difference between male and female students in their academic engagement levels ($t = 3.411$, $p = 0.001$). Male students recorded a higher mean academic engagement score ($M = 62.45$) than female students ($M = 58.17$). This implies that gender had a notable influence on how engineering students participated in academic activities. The result suggests that female students tend to be less engaged academically, which may be attributed to the heavier financial burden or socio-cultural factors they face within the learning environment.

This aligns with the finding of Eze and Ibeh (2022) they discovered that female students often incur higher transportation and personal security expenses, which reduce their time and energy for academic involvement. The gender disparity in engagement revealed by this study is particularly significant within the context of engineering education, where learning involves high-cost practical sessions, laboratory work, and group projects. Female students may experience additional challenges balancing financial pressures with academic commitments, especially in a male-dominated field. According to Giwa and Sheu (2022), female students in technical disciplines often experience limited access to resources and support systems compared to their male counterparts, affecting their learning engagement. The findings from this study therefore confirm the persistence of gender-related inequalities in engineering education in Nigeria.

The result from hypothesis two showed a statistically significant variation in private educational costs among students from different engineering departments ($F = 5.328$, $p = 0.000$). This indicated that students studying in various engineering disciplines experience different financial demands. The findings suggest that students in disciplines that require more practical sessions such as Mechanical, Civil, and Chemical Engineering tend to spend more on materials, laboratory equipment, and fieldwork activities. This finding is consistent with Mwangi and Githinji (2021), who reported that engineering programs with intensive workshop and project requirements are associated with higher private educational costs. The result further revealed that departmental differences in cost structures can significantly influence students' learning experiences. These variations make some departments more financially demanding than others, potentially affecting students' engagement, motivation, and performance. Tiamiyu (2020), also opined that unequal distribution of financial burdens across departments can lead to feelings of frustration and inequality among students, particularly when institutional support is limited. What makes this finding unique is its contextual focus on a Nigerian public university.The result from hypothesis three revealed a moderate but statistically significant positive relationship between private educational costs and dropout intentions ($r = 0.456$, $p = 0.000$). This indicates that as students face higher private educational expenses, their likelihood of considering withdrawal from school increases. The finding corroborates Nwachukwu and Etim (2019), who found that financial challenges were responsible for about 38% of student dropout intentions in Nigerian universities. This result also reflects the reality that engineering students, due to the technical nature of their programs, face extra financial demands such as purchasing project tools, paying laboratory fees, and securing accommodation near campus. These hidden costs can accumulate and push students—especially those from low-income families—toward financial exhaustion, anxiety, and eventual withdrawal. Nyarko and Adomako (2020) similarly reported that in Ghana, rising private educational costs such as rent and transportation increased dropout rates among tertiary students from rural backgrounds. What is new and significant in this finding is that it quantifies the connection between private educational costs and dropout tendencies within a faculty-specific context.

Conclusion

The study has revealed that private educational costs significantly affect the academic experiences of engineering students, with notable gender disparities, departmental cost variations, and a moderate positive correlation between high expenses and dropout intentions. Male students reported higher academic engagement than females, possibly due to the additional financial burdens disproportionately borne by female students. Furthermore, the study confirmed that some engineering departments require higher private expenditures than

others, particularly those involving intensive practical work. Lastly, rising private costs such as accommodation, feeding, and transportation increase the likelihood of dropout among students. These findings highlight the urgent need for targeted, equitable financial interventions to support engineering students across Nigerian universities.

Recommendations

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

1. Universities should introduce targeted support programs for female engineering students who face additional personal and social expenses. These may include subsidized campus accommodation, free or discounted transportation services, and the establishment of a "Women in Engineering Support Fund" to provide small grants for learning materials and safety needs.
2. Since departments such as Mechanical and Civil Engineering require more expensive tools, laboratory work, and field projects, universities should create departmental support budgets. These funds could be used to purchase shared laboratory equipment, sponsor student projects, or provide cost-sharing arrangements for essential materials.
3. Universities, in partnership with government agencies and private industries, should expand scholarship and bursary programs for students from low-income backgrounds. Engineering faculties can collaborate with professional bodies like the Nigerian Society of Engineers (NSE) and corporate organizations in the oil, energy, and construction sectors to fund annual scholarships and paid internships.
4. Institutions should develop flexible payment systems that allow students to pay tuition and other fees in installments over the semester rather than in lump sums. In addition, universities should consider bulk purchasing of essential academic materials (e.g., drawing sets, lab coats, and project kits) and distribute them to students at subsidized rates.
5. The Federal Ministry of Education and the National Universities Commission (NUC) should establish a regulatory framework mandating universities to report annually on student cost burdens and retention rates.

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