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Analysing Critical Determinants of Learner Attrition in Open and Distance Learning: Effect on Coefficient of Efficiency

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ABSTRACT

In Nigeria, attrition of learners is a major impediment to the viability of Open and Distance Learning (ODL). The coefficient of efficiency (CE), a UNESCO indicator was used to measure the utilisation of resources and inefficiency at selected World Bank-supported Africa Centres of Excellence (ACE). This paper examined determinants of attrition in ODL categorized into socio-economic, institutional, technological, and pedagogical factors from 17 peer-reviewed studies. Data were analysed using the mean and the standard deviation. The results prove that the mean impact of socio-economic factors (X = 4.3, SD = 0.6) was the highest, and then, institutional factors (X = 3.9, SD = 0.7). The other two were of greater importance than the technological factors (X = 3.5, SD = 0.5) and pedagogical factors (X = 3.2, SD = 0.4). Research indicate that ongoing attrition reduces the benefits of education, increases the program less inclusive and less effective in donor-sponsored ODL programs. The research recommended policies, direction for future work and practical implementation, including promoting systems to support students, enhancement of digital facilities, and application of some measures to minimize dropout rate. The paper concluded, stating that addressing the determinants leading to attrition, ODL institutions in Nigeria can be able to optimize their CE, use their resources better, and achieve the greater objectives of access, equity, and sustainable development in higher education.

Keywords: Learner Attrition; Open and Distance Learning (ODL), Higher Education Institutes; Coefficient of Efficiency (CE); Africa Centres of Excellence (ACE).

1.0 INTRODUCTION

Open and Distance Learning (ODL) has introduced a major change in the delivery of higher education in underdeveloped nations where the level of access and infrastructure restricts the traditional means of education (Mohamed and Zainal, 2020). Within the past two decades, ODL has gained increased significance in terms of offering inclusive, flexible, and lifelong learning opportunities. This corresponds to Sustainable Development Goal 4 (SDG-4), which is devoted to equal access to high-quality education (Achuthan *et al*., 2024; Mathew and Chung, 2021). In different developing countries, ODL systems continue to experience high rates of learners' attrition, which undermines their effectiveness, sustainability, and influence on society in general (Maritim and Getuno, 2018; Guzman Rincon *et al*., 2024; Alarifi and Song, 2024). Attrition in ODL refers to the fact that students drop their programs or fail to complete their courses before they can be awarded a degree or certification (Ndunagu *et al*., 2024). This incident indicates that the school system is not quite utilizing its resources, which is an educational issue. According to the United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Coefficient of Efficiency (CE) is a valuable educational indicator that examines the efficiency of utilisation of time and resources in creating graduates. This is calculated by dividing the total number of years that a group of students have been in school by the

optimum number of years, keeping in consideration the fact that there are no cases of dropouts or repeaters (Hallak, 1967; UNESCO, 2004). High CE is an indicator that the system is functioning efficiently and not squandering a lot of money whereas low CE is an indicator that a significant amount of money is being lost due to dropouts, repeats, or time-consuming enrolments.

ODL in Nigeria, especially in universities that are part of the Africa Centres of Excellence (ACE) Project funded by the World Bank, have played a significant role in the provision of access to tertiary education. A good example is the Africa Centre of Excellence on Technology-Enhanced Learning (ACETEL) at the National Open University of Nigeria. ACETEL uses online material, specifically the Moodle Learning Management System (LMS) to serve the heterogeneous student population which consists of employed adults and geographically spread students. Despite these developments, high learner turnover is a formidable problem, despite the fact that the human resource, facilities, and computerisation of curriculum content have been heavily invested in (Ndunagu *et al*., 2024). Evidence based on the research shows that the rate of dropout differs significantly among ODL institutions such as the National Open University of Nigeria (NOUN) and the Centre of Distance Learning of Obafemi Awolowo University, depending on the type of program and student population (Akande, 2021). Open and Distance Learning programs can be said to lose students due to a multiplicity of factors. The socioeconomic factors that hinder the further involvement of students are financial, work-related, and family-related (Guzmán Rincón *et al.*, 2024). Disengagement is worsened by institutional barriers, including rigid evaluation procedures, lack of support to learners, and bureaucracy (Alwerthan, 2025). Technological challenges, especially those that may occur within the resource-restricted environments, are also important obstacles; poor internet connectivity, poo digital literacy, and poor LMS performance hinder successful participation (Lin, 2025). Moreover, the absence of interactive education and prompt feedback of the instructor is also a pedagogical failure that reduces motivation and a feeling of community among remote students (Lyyra, Anttonen, and Waselius, 2024).

The relationship between the learner attrition and CE is also a pointer of the economic use of human and material resources in a higher educational establishment (Okebukola, 2022). Increased attrition or dropout rate will require more time and money to graduate students, and at the same time decrease the number of graduates per cohort. This reduces the CE and hence indicates that the learning process is inefficient and leads to a wastage of time and resources. An example is, the CE of a programme with a student enrolment of 4,208 and a graduation of 3,907 was 92.85%. This number means that 7.15% of students failed to finish their studies. When these inefficiencies are combined in several programmes, they will result in significant losses in the economy in terms of productivity and hinder human capital development. ODL institutions across the globe have devised various measures of reducing student dropouts. It encompasses predictive analytics that forecast students who are at the risk of premature attrition (Abadal *et al*., 2022; Li *et al*., 2022; Abadal *et al*., 2022), custom learner support systems (Maritim and Getuno, 2018), and adaptive learning platforms that improve the engagement of students (Lin, 2025). Idiosyncratic differences in the infrastructure, policy, and socio-economic conditions limit the transferability of these interventions to the African context. The study by Ndunagu *et al*. (2024) offers a background upon which one may continue their research regarding the factors that affect attrition in the tertiary education system in Nigeria. Although some of the contributors have been reported based on a survey that was carried out in the National Open University of Nigeria in the

year 2010 to 2020, the results have not been inferred to other institutions in Nigeria that offer ODL and blended learning. In addition, the relationship between technologies acceptance and student retention in Africa is not studied well (Alarifi and Song, 2024).

This paper fills these knowledge gaps by looking at the main reasons of student attrition in the Nigerian ODL programmes and how they affect the CE. It compiles the results of seventeen peer-reviewed articles, some of which have been conducted in ACE institutions. To determine the key factors of attrition and evaluate their impacts, descriptive statistics (mean and standard deviation) were used. It aims at examining the major factors that contribute to student attrition in open and distance learning.

The study ends up providing practical insights to institutional planners, policymakers and development partners that will promote the performance of ODL institutions.

Research Question:

a) (RQ1) What are the critical determinants of learner attrition in Nigerian Open and Distance Learning programmes?
b) (RQ2) What is the effect of learner attrition on the Coefficient of Efficiency?

The objectives of this study are to:

a) Identify and classify the critical determinant affecting learner attrition in Nigerian Open and Distance Learning programmes;
b) Assess the comparative influence of socio-economic, institutional, technological, and pedagogical aspects through descriptive analysis;
c) Analyse the correlation between learner attrition and the CE and
d) Propose policy proposals to enhance retention and optimise educational efficiency in Open and Distance Learning institutions.

2.0 MATERIALS (LITERATURE REVIEW)

2.1 Theoretical Frameworks on Student Attrition

Tinto's Model of Student Retention (1975) and Kember's Model of Student Persistence in Distance Education (1989) are the basis for modern studies of student attrition (Appavoo *et al*., 2023; Musingafi *et al*., 2015). Tinto's theory posited that the more a student is integrated into social and academic activities in an educational setting, the more they are likely to preserve and complete their studies (Tinto, 2019). This implies that when students don't make strong intellectual and social connections, they lose interest in their studies and eventually drop out. Research by Kember (1989) builds on Tinto's work by adding that in open and distance education, support networks, self-motivation, and external commitments are significant in determining learner retention (Musingafi *et al*., 2015). The framework is further elaborated in the contemporary literature using the indices of digital engagement, institutional feedback and technological support (Guzmán Rincón, Sotomayor Soloaga, Carrillo Barbosa, and Barragana-Moreno, 2024; Alwerthan, 2025). These theories collectively emphasised that attrition is determined from an intersection of socio, institutional, and personal factors.

2.2 Socio-Economic Determinants

In distance education, socioeconomic status (SES) continues to be a crucial predictor of attrition (Maritim and Getuno, 2018). Students from households with less money have trouble studying because they can't get to equipment, the internet connection isn't always reliable, and they have other financial obligations that get in the way of their study time (Musingafi *et al*., 2015). According to Alarifi and Song (2024), online education is flexible, but at the same time, it worsens the situation regarding access to necessary digital tools by learners. In less developed tions, including Nigeria, with a strong

income inequality and uneven access to electricity, the low socioeconomic status of students leads to a decline in their engagement, which is the cause of high dropout rates (Ndunagu *et al*., 2024). This implies that students from poor socioeconomic background are disadvantaged because they don't have the financial means to provide the necessary environment and digital resources to pursue their academics. Guzmán Rincón *et al*. (2024) and Ranasinghe *et al*. (2024) found that financial hardship and a lack of support from family or the community are strongly linked to the desire to drop out of school. The latter stressed that socioeconomic limitations affect retention. This means that socioeconomic position has a direct effect on attrition, although institutional interventions like scholarship programs, flexible payment plans, and strong counselling services could lessen its effect.

2.3 Institutional Determinants

Student retention is significantly affected by institutional factors such as means of communication, learning management systems, policies in organizations, feedback, efficiency in administration, and assessment instruments (Mathew and Chung, 2021; Lyyra *et al*., 2024). Weak academic advising, lack of response, and failure to respond to student queries are some of the most common issues in the ODL institutions (Mohamed and Zainal, 2020). According to a recent survey, Alwerthan (2025) considered the wait time of feedback in the context of ODL and stated that institutional practices are streamlined to increase the engagement of learners and reduce the attrition. Guzmán Rincón *et al*. (2024) noted that the satisfaction of a student with institutional practices is a predictor of his or her intention to continue with the studies. Therefore, the institutions that define the academic structures, quick feedback systems and receptive learner management systems are usually more likely to keep a greater percentage of students. Effectiv communication and regular administrative processes are necessary in Nigeria where ODL institutions are widespread in various fields to maintain student interest and promote academic advancements.

2.4 Technological Determinants

Technology can either improve learners' participation or disengagement in ODL, depending on how it is set up, ease of use and who can use it (Lin, 2025). Some examples of technological aspects are how easy it is to use a platform, how reliable a system is, how interactive it is, and how digitally literate students are. Lin's (2025) study of online learning platforms shows that poor training for students, unreliable servers, and poorly designed interfaces all lead to students losing interest and dropping out. On the other hand, interactive learning management systems (LMS) that use analytics and tailored feedback systems increase completion rates. Alarifi and Song (2024) argued that to reduce attrition, educational institutions must provide a comparable system that has no disparity between the face-to-face and the online delivery. This is in line with what Maritim and Getuno (2018) found in their research, which showed that attrition is worse when infrastructure is poor, such as when the internet is unreliable and there aren't enough local content repositories. To enhance the retention of learners in ODL, there is a need to invest into the digital infrastructure and training the users technically.

2.5 Pedagogical Determinants

The use of pedagogical practices in learning institutions is observably associated with engagement of learners (Ndunagu *et al*., 2024). The teaching methodologies implementation in the context of ODL requires a learner-focused orientation, which involves the use of the synchronous and asynchronous ways of delivery (Musingafi *et al*., 2015). In this regard, course content should be designed in a manner that includes self-directed learning material, student-

focused design, explicit structural framework with preset outcomes, interactive learning, embedded evaluation systems, easy access multimedia formats, contextual relevance, and unambiguous provisions to learners (National Universities Commission [NUC], 2025b). ODL pedagogy will require an integrated approach to provide immediate feedback and a logical framework of instructional design to ensure student engagement (Lyyra *et al*., 2024). Without these structural components, students are likely to be emotionally detached and psychologically stressed thereby increasing the rate of attrition. Guzmán Rincón *et al*. (2024) and Maritim and Getuno (2018) show that the students who feel that their courses are overly theoretical or poorly structured are more likely to discontinue their enrolment. The teachers must display adaptability in the implementation of digital pedagogy. Furthermore, retention is also strengthened by education of academic personnel on inclusive online pedagogy, particularly when dealing with students with varied learning styles and special needs learners.

2.6 Integrated Determinants and Conceptual Gaps

Although the literature review carried out recognizes the multifacetedness of the issue of learner attrition, numerous studies have explored them individually as opposed to using an organized framework. There have been a significant number of studies that have not provided quantitative relationships between drivers of attrition and quantifiable measures of efficiency like CE. The effect of an institutional feedback, institutional provisioning, and institutional support on attrition were analyzed by Alwerthan (2025) and Alarifi and Song (2024). According to Okebukola (2022), CE is a major independent variable that is associated with the dependent variable of attrition. The UNESCO measure, which is a comparative measure of ideal and actual time-to-completion of an educational system, is significantly affected by attrition (Hallak, 1967; UNESCO, 2004). ODL has often significantly lower retention rates than traditional institutions of higher learning (Lyyra, Anttonen, and Waselius, 2024). The lack of engagement and following withdrawal can be explained by the disconnectiveness of distance learning, inadequate interaction between learners and instructors, and the digital divide in the situations of limited resources (Ndunagu *et al*., 2024; Mohamed, 2020).

3.0 METHODS

3.1 Research Design

The present research used a systematic method of selection and review of the literature, which combined quantitative and descriptive research methods. As a methodological template, the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) framework was used. This methodology allowed the recognition, isolation, and interpretation of common variables that led to attrition of learners in peer-reviewed articles. As well, the study explored these factors through triangulation with the CE, which is a UNESCO-approved measure of resource use and postsecondary education institution inefficiencies. Computations of values of CE were done among the selected ACEs which used ODL and blended methods of instructional delivery.

3.2 Data Sources and Search Strategy

The only places to get data were ProQuest, Scopus, and Google Scholar, and the only journals used were peer-reviewed ones that were published between 2018 and 2025. "Online learning dropout determinants," "distance learning completion rate," "learner attrition in ODL," and "coefficient of efficiency in higher education" were some of the search terms. 47 preliminary records were retrieved throughout the search. After checking for methodological rigour, relevance, and duplication, 17 articles matched the criteria for inclusion. All of the chosen papers provided verifiable DOIs and theoretical or

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empirical insights into the factors that lead to learner attrition.

3.3 Data Extraction and Coding

Each study was reviewed and coded based on four dominant determinant categories derived from the literature:

1. Socio-economic Factors (SEF)
2. Institutional Factors (INF)
3. Technological Factors (TEF)
4. Pedagogical Factors (PDF)

The weight of each determinant was measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), in order to gauge its effect on variables.

3.4 Analytical Procedure

Data were computed to determine the mean ($\bar{X}$) and standard deviation (SD. Microsoft Excel and SPSS version 27 were utilised to calculate the mean ($\bar{X}$) and standard deviation (SD). These metrics were selected to represent the extent of variation and the strength of determinant influence in the analysed studies. The subsequent analytical formulas were utilised:

$$\bar{X} = \frac{\sum x_i}{n}$$

$$SD = \sqrt{\frac{\sum (x_i - \bar{X})^2}{n-1}}$$

where $x_i$represents each study's score and $n = 17$.

3.5 Validity and Reliability

The application of uniform rating scales across the data guaranteed reliability. The data were reviewed by two staff working in the Africa Centre of Excellence on Technology Enhanced Learning (ACETEL) to determine the inter-rater reliability. A stable consistency of the coding procedures was supported by the reliability value of Cohen Kappa (k=0.81), which is a significant agreement. The triangulation was introduced as the combination of empirical validation based on the current open-access literature (Lin, 2025; Lyyra et al., 2024) and conceptual classification based on the existing theoretical frameworks (Tinto, 2019), which contributed to the improvement of the overall validity.

Table 1: Determinant Categories and the Corresponding Analytical Indicators

Determinant Category	Analytical Indicators	Quantitative Measure	Expected Impact on CE
Socio-economic Factors	Income stability, social support, family obligations	Mean and SD	High (negative correlation)
Institutional Factors	Support services, feedback mechanisms, administrative efficiency	Mean and SD	High (moderate correlation)
Technological Factors	Platform reliability, connectivity, digital literacy	Mean and SD	Moderate (positive correlation)
Pedagogical Factors	Instructional design, feedback quality, learner engagement	Mean and SD	Moderate (positive correlation)

3.6 Limitations

The methodology is constrained by the absence of original data collecting and the availability of peer-reviewed papers. Comparability may be affected by variations in the operational definitions of "attrition" among research, as the analysis relies o secondary literature. Statistical normalisation using standard deviation and the mean are used to mitigate this weakness.

4.0 RESULTS AND DISCUSSION

4.1 Overview

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This chapter presents the analytical findings from a systematic analysis of 17 peer-reviewed research on learner attrition in ODL. The primary factors of attrition and their corresponding impacts on the CE were identified by descriptive statistics, including mean and standard deviation. The determinants discussed were grouped into four main categories which include socioeconomic, institutional, technical, and pedagogical factors. The analysis provides quantitative data outlining the effect of each determinant on the attrition of learners. The results indicate that the trend on persistent attrition negatively impacts on the utilisation of resources and sustainability of education in the ODL system of Nigeria.

4.2 Descriptive Statistical Findings (Mean and Standard Deviation)

Table 4.1 provides a summary of the mean (X) and standard deviation (SD) estimates derived from the 17 examined research. The greatest average impact was noted in the socio-economic categories (X = 4.3, SD = 0.6), indicating that they are the most prevalent and significant predictors of attrition. Institutional variables were placed second (X = 3.9, SD = 0.7), whereas technological (X = 3.5, SD = 0.5) and pedagogical (X = 3.2, SD = 0.4) elements were somewhat relevant nevertheless significant.

Table 2: Summary of Mean and SD for Learner Attrition Determinants (n = 17)

Determinant Category	Mean (X̄)	Standard Deviation (SD)	Interpretation
Socio-economic Factors	4.3	0.6	Very High Influence
Institutional Factors	3.9	0.7	High Influence
Technological Factors	3.5	0.5	Moderate Influence
Pedagogical Factors	3.2	0.4	Moderate Influence

This means that socio-economic factors support the importance of financial statuses of learners, family roles, and work restrictions in persistence in online distance learning programs (Ranasinghe *et al*., 2024; Guzmán Rincón *et al*., 2024).

4.2.1 Visual Representation

The impact of the determining categories is relative, as shown in figure 4.1. The evident pattern illustrates that the socio-economic and institutional factors have a stronger impact to the technological and pedagogical factors, hence highlighting systemic and support-related challenges to retention among learners.

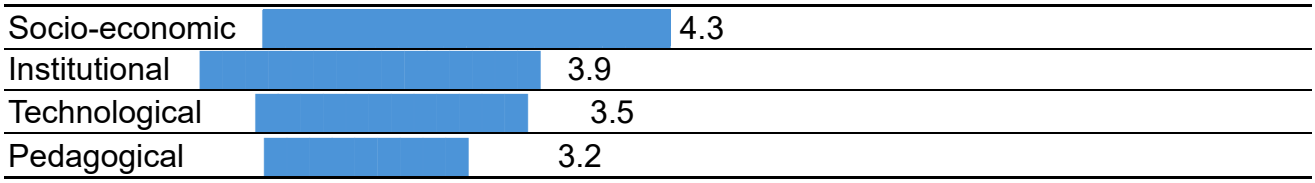

Figure 2: Mean Influence of Attrition Determinants in ODL (n = 17)

4.3 CE Analysis

The CE offers a performance statistic that correlates attrition with overall system productivity. Employing UNESCO's CE formula:

$$CE = \frac{\text{Ideal duration for completion}}{\text{Actual duration for completion}} \times 100$$

The analysis was done on data collected in a list of African Centres of Excellence (ACEs) that use the open, distance, and blended learning modalities. The Disbursement Linked Indicators (DLIs) are the performance measures used by the World Bank as well as the Association of African Universities (AAU) to measure the progress and guide financial allocations (Africa Centres of Excellence [ACE], 2025). In particular, the DLI 2, which is attributed to Development Impact through Graduated Students, is used to assess the effectiveness of an institution in helping students to graduate. It measures the number of students including Master and PhD students who graduate successfully in the ACEs. It puts a lot of emphasis on the results of graduation rather than enrolment rates. The payments are then conditionalized on the number of graduates, especially in the key subject areas, female scholars, and regional students. The verification procedures are conducted in the form of independent assessment, the results of which are provided to the World Bank by the AAU and National Facilitation Units (NFUs) (National Universities Commission [NUC], 2025a). An aggregate analysis revealed that the average CE was 93.52% indicating that although the system was relatively efficient, the proportion of learning effort and institutional resources spent on dropout and delayed completion is about 6.48% ineffective. These results are in line with other studies conducted by Alwerthan (2025) who indicated that institutional support and engagement play a significant mediating role in temporal efficiency in e-learning environment.

Table 4.2: Coefficient of Efficiency for Selected ACE Implementing ODL/ Blended Learning extracted from document titled *Key Achievements and Impacts of the Africa Centres of Excellence Project in Nigeria*, Vol. 1, a Compendium of the National Universities Commission (National Universities Commission, 2025).

Centre of Excellence	Ideal Duration (years)	Actual Duration (years)	Coefficient of Efficiency (%)
ACE: Obafemi Awolowo ICT-driven knowledge Park (OAK-Park) M.Sc Programmes ▪ Electronic and Electrical Engineering ▪ Mechanical Engineering ▪ Agricultural and Environmental Engineering	2	2.2	90.91
ACE: Drug Research, Herbal Medicine Development and Regulatory Science (ACEDHARS) M.Sc Programmes ▪ Biomedical Toxicology ▪ Drug Discovery and Development ▪ Herbal Medicine ▪ Regulatory Science ▪ Pharmacovigilance	2	2.1	95.24
ACE: Technology-Enhanced Learning (ACETEL)	2	2.15	93.02

M.Sc Programmes ▪ Artificial Intelligence ▪ Cybersecurity ▪ Management Information Systems			
ACE: Future Energies and Electrochemical Systems (ACEFUELS) M.Sc Programmes ▪ Corrosion Technology ▪ Electrochemical Technology ▪ Future Energies ▪ Nanotechnology ▪ Energy Management and Entrepreneurship	2	2.05	97.56
ACE: Innovative and Transformative STEM Education (ACEITSE) M.Sc Programmes ▪ STEM Education and Entrepreneurship (with Specialization in Biology, Chemistry, Physics or Mathematics) ▪ ICT Education (with Specialisation in Artificial Intelligence or Cybersecurity)	2	2.25	88.89
Average CE	—	—	**93.52**

A CE of 100% would refer to the fact that there are no dropout rates, limited engagement, or administrative delays, which are considered as inefficiencies (UNESCO, 2004). In line with this, prevention of attrition is critical in ensuring that there is learner achievement and enhancement of institutional performance indicators.

4.4 Discussion of Key Findings

4.4.1 Socio-economic Factors

The primary determinants of attrition were socio-economic characteristics. Students are often faced with the issues on how to balance between professional and family life and financial restrictions, which subsequently lead to dropping out of the program or partial attendance. This fact is consistent with Ranasinghe *et al*. (2024) and Maritim and Getuno (2018) who reported an increased risk of attrition among low-income students within the context of ODL. Moreover, monetary insecurity hinders access to the internet and the acquisition of the necessary devices needed to participate in e-learning (Lyyra *et al*., 2024).

4.4.2 Institutional Factors

The secondary most persuasive variable of student persistence that was found in the current analysis relates to the institutional variables, namely administrative efficiency, timely feedback mechanisms, and learner support systems. Empirical research by Guzman-Rincon *et al*. (2024) and Alwerthan (2025) can be used to demonstrate that institutional satisfaction is a salient predictor of student retention. Weaknesses in the responsiveness of the feedback systems and long-term communication discharge have a negative impact on the student motivation, and, accordingly, lead to the development of disengagement. The claim made by Alarifi and Song (2024) that the responsiveness of the organization and the effectiveness of the institutional leadership have a strong impact on the continuity in academics is supported by statistical data, particularly in the context of a hybrid educational setting.

4.4.3 Technological Factors

Moderate effect was played by technological components (X = 3.5, SD 0.5). Lack of digital literacy, connectivity, and bandwidth are also

very serious issues. According to Lin (2025), the usability of a system and real-time assistance are essential to maintain the interest of learners. Although the ODL systems are supposed to be inclusive, there are still technological inequalities, especially in sub-Saharan Africa (Lyyra *et al*., 2024).

4.4.4 Pedagogical Factors

The moderate but statistically significant impact is experienced by instructional flexibility, pedagogical framework, and learner-teacher interaction (X mean = 3.2, SD = 0.4). Contemporary digital learning systems and interactive modules represent adaptive learning and interactive modules that empirical studies have shown to improve retention (Maritim and Getuno, 2018). On the other hand, lack of motivation by the learners due to the lack of relevancy in course material or the lack of responsiveness of course instructors raise the chances of attrition.

4.5 Comparative Synthesis (Responses to RQ1 and RQ2)

RQ1 was investigated through comparative synthesis of reviewed literature, and it was found out that student attrition in Nigerian ODL programmes is caused by a constellation of interrelated variables. The major contributory factors include socioeconomic bottlenecks including low budgets and employment demands and institutional inefficiencies including slow administrative processes, lack of student support systems and feedback systems. A significant impact on these trends is imposed by technological and pedagogical factors, specifically the insufficient digital infrastructure, a lack of digital literacy, and the inappropriate design of instructions. This contact is what makes it clear that holistic interventions that combine financial aid, institutional policy change, and technology-based pedagogical methods can reduce attrition. The CE analysis indicates that the effect of learner attrition has signific negative impact on the overall performar of the education system hence answering RQ2. In the paradigm of results-based funding developed by the World Bank, which is operationalized in terms of Disbursement Linked Indicators (DLIs), Centres of Excellence are awarded all the financial incentives in case successful students graduate in a timely manner. On the other hand, the centres with high dropout rates or slow completion are characterised by low CE values, which indicates the ineffective use of the educational resources. The CE analysis shows that a small decrease in the rates of attrition can produce a significant improvement in institutional efficacy. As an example, raising CE by 93.52% to 96% would save about 0.6 academic years per learning group, other things being equal. This would enhance throughput and lower the unit cost of graduate. The attractively planned decrease in attrition also represents a successful method of enhancing the efficiency, responsibility, and sustainability of the Open and Distance Learning system in Nigeria.

5.0 CONCLUSION

The current study explored the variables that affect the student attrition in the ODL settings and evaluated the effect on CE, which is a UNESCO-acknowledged measure of educational system performance. The analysis shows that the technological and pedagogical factors have some significance but not as strong as the socio-economic and institutional ones which have the strongest impact on attrition. Results indicate that attrition is a multifaceted systemic phenomenon, which occurs due to the difficulties in teaching, administration, technology, and finance. Every student record that is not finished or is late represents a decrease in investment and potential human capital in terms of instruction; therefore, the CE study shows that the attrition significantly decreases the vinstitutional efficacy. In order to improve CE in ODL institutions, there is urgent need to have integrated institutional, social and

technological programs that will deal with all the drivers identified. This study illustrates that successful retention in ODL systems is a strategic necessity to meet national goals to do with access, equity, and long-term growth of higher education, and is also a center of academic policy making. To ensure a reduction in dropout rates and enhance the learning experience of learners in the remote learning model in Nigeria, it is necessary to strengthen institutional capacity, implement new pedagogical strategies, and achieve digital inclusiveness.

5.1 Recommendations for Further Studies

Further research on the topic using Machine Learning (ML) and Deep Learning (DL) techniques can pinpoint with high degree of accuracy the likelihood of learner attrition. This study lays a blueprint for further determinants of attrition using student demographics, engagement logs, socio-economic, technological, institutional and non-institutional challenges. Qualitative designs using focus groups or interviews is recommended for use in future studies to clarify the already identified factors or explore others that may determine retention or withdrawal among learners and improve the current meta-analytical model. This will further enhance the establishment of specific interventions and early warning mechanisms.

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Data Availability Statement: All the information that supports the results of the current research was obtained through publicly available secondary sources, namely peer-reviewed journal articles which can be indexed using ProQuest and CrossRef DOI databases, and reports published by the Africa Centre of Excellence (https://ace.edu.ng). Additional information and supplementary materials will be availed by the respective author on a reasonable request.

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