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Challenges in Adopting Computer Studies in Public Secondary Schools in Kasama District, Zambia

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Abstract **– This study investigated the challenges faced in the adoption of Computer Studies as a subject in five selected public day secondary schools in Kasama District, Northern Province of Zambia. The research employed a mixed-methods approach, utilizing questionnaires and interviews to collect data from head teachers, subject teachers, and pupils. The findings revealed significant challenges including shortage of computers, lack of teaching and learning materials, overcrowded classrooms, teacher absenteeism, inadequate furniture, and insufficient trained teachers. The pupil-to-computer ratio ranged from 3:1 to 4:1 in some schools, negatively impacting practical learning experiences. The study recommends increased government investment in ICT infrastructure, establishment of public-private partnerships, prioritization of teaching materials procurement, and enhanced teacher training programs. The findings contribute to understanding the implementation gaps in Zambia's educational technology policy and provide practical recommendations for improving Computer Studies delivery in resource-constrained environments.**

Keywords **– Computer Studies, ICT integration, secondary education, challenges, Zambia, educational technology.**

I. INTRODUCTION

1. Background of the Study

In the 21st century, Computer Studies has emerged as a fundamental subject essential for preparing learners to participate meaningfully in the global knowledge-based economy. Information and Communication Technology (ICT) integration in education represents a paradigm shift from traditional teacher-centered approaches to learner-centered, technology-enhanced pedagogical practices (Ghavifekr & Athirah, 2015). The global movement toward a knowledge-based society has elevated the importance of Computer Studies in education systems worldwide, with governments increasingly recognizing technology as a transformative tool for sustainable development (UNCTAD, 2018).

Zambia, as a developing nation, has acknowledged the significance of ICT in education through its national policy framework. The National Educational Policy, "Educating our Future," emphasizes producing learners capable of appreciating the relationship between scientific thought, action, and technology in sustaining quality of life (MOE, 1996). Furthermore, the Ministry of Education, Science, Vocational Training and Early Education (MESVTEE, 2013) formally introduced Computer Studies as a compulsory subject in secondary schools, signaling the government's commitment to preparing learners for the digital age.

However, the successful implementation of Computer Studies faces numerous challenges, particularly in resource-constrained settings. Despite policy commitments, Zambia continues to grapple with "weak budget performance associated with late, erratic, and inadequate funding to the education sector" (UNESCO, 2016:20). These financial constraints, compounded by issues of corruption and misappropriation of funds, significantly hamper the effective delivery of Computer Studies in public schools (Kelly, 1999).

2. Statement of the Problem

The introduction of Computer Studies in Zambian secondary schools represents a progressive step toward educational transformation. However, the effective implementation of this subject faces numerous obstacles that compromise its potential benefits. Many public schools, particularly in rural districts like Kasama, lack adequate infrastructure, equipment, and trained personnel to deliver quality Computer Studies education. The disparity between policy intentions and practical implementation creates a situation where learners may be disadvantaged in acquiring essential digital skills necessary for participation in the modern economy.

Despite the recognized importance of Computer Studies, there is limited empirical research examining the specific challenges affecting its implementation in Zambian public schools, particularly in rural areas. This study addresses this gap by investigating the challenges and opportunities of introducing Computer Studies in selected public day secondary schools in Kasama District, Northern Province of Zambia.

3. Research Objectives

- To identify the challenges faced in the teaching and learning of Computer Studies in selected public day secondary schools in Kasama District.
- To establish the pupil-to-computer ratio in the selected schools.
- To assess the academic performance of pupils in Computer Studies examinations.
- To determine measures for enhancing the teaching and learning of Computer Studies in the selected schools.

4. Research Questions

- What challenges are faced in the teaching and learning of Computer Studies in selected public day secondary schools in Kasama District?

- What is the pupil-to-computer ratio in the selected schools?
- What is the academic performance of pupils in Computer Studies in the selected schools?
- What measures can be put in place to enhance the teaching and learning of Computer Studies in the selected schools?

II. LITERATURE REVIEW

1. Global Perspective on ICT Integration in Education

The integration of ICT in education has been widely recognized as a catalyst for improving the quality and accessibility of learning worldwide (Yusuf, 2005). ICT enhances flexibility in education delivery, enabling learners to access knowledge anytime and from anywhere, thus promoting learner-driven processes that better prepare students for lifelong learning (Young, 2002). The potential of ICT to transform pedagogical practices and increase the breadth and richness of teaching and learning has been well-documented in educational research.

Globally, the level of ICT availability in education varies significantly among countries. Nations have invested heavily in networking classrooms and increasing the number of computers in schools (Mofarreh, 2016). In the Kingdom of Saudi Arabia, the King Abdullah Project for General Education Development allocated $2.4 billion to finance the advancement of selected public schools, focusing on achieving internationally competitive educational standards. Similarly, developed nations have made substantial investments in educational technology infrastructure.

However, the mere presence of technology does not guarantee effective integration. Pelgrum and Pomp (1993) conducted a comprehensive study at the University of Twente in the Netherlands on the use of computers in education across 18 countries. Their findings revealed that despite significant increases in computer availability in schools during the 1980s, the integration of computers into existing subjects progressed slowly. Teachers' limited time, lack of quality software, and inadequate teacher training were identified as major challenges. These findings remain relevant for understanding implementation challenges in developing contexts.

Teachers' attitudes toward Computer Studies play a crucial role in the success of ICT integration. Studies by Al-Zaidiyean et al. (2010) and Albirini (2006) confirmed that teachers' beliefs, attitudes, and practices are important determinants of effective ICT implementation. Positive attitudes correlate with more effective integration, while negative perceptions can undermine even well-resourced programs.

2. African Perspective on Computer Studies in Education

African countries face unique challenges in integrating ICT into education, primarily related to infrastructure deficits, limited financial resources, and competing educational priorities. The digital divide between African nations and developed countries remains substantial, with many schools lacking basic electricity, internet connectivity, and adequate computer facilities.

Despite these challenges, several African countries have made progress in integrating ICT into their education systems. South Africa, Kenya, and Rwanda have implemented national ICT in education policies and made significant investments in infrastructure and teacher training. However, the effectiveness of these initiatives varies considerably, with urban schools generally better equipped than rural institutions (Mandoga et al., 2013).

The contextual challenges facing African education systems include inadequate funding, high teacher-pupil ratios, limited technical support, and insufficient integration of ICT into teacher training programs. These challenges are particularly acute in rural areas, where infrastructure deficits compound implementation difficulties.

3. Zambian Perspective on Computer Studies Education

Zambia has recognized the importance of ICT in education through various policy frameworks. The National Educational Policy, "Educating our Future" (MOE, 1996), and subsequent policy documents have emphasized the role of technology in promoting educational quality and national development. The introduction of Computer Studies as a compulsory subject in secondary schools represents a significant policy commitment to preparing learners for the digital economy.

However, implementation has faced considerable challenges. UNESCO (2016) noted Zambia's weak budget performance in education, characterized by late, erratic, and inadequate funding. These financial constraints have directly impacted the provision of ICT infrastructure, teaching materials, and teacher training for Computer Studies.

Studies on ICT integration in Zambian schools have revealed several challenges, including insufficient computers, lack of qualified teachers, inadequate electricity supply, poor internet connectivity, and overcrowded classrooms (MESVTEE, 2013). These challenges are more pronounced in rural districts like Kasama, where resource constraints are particularly acute.

III. METHODOLOGY

1. Research Design

This study employed a descriptive survey research design with mixed-methods approaches, combining quantitative and qualitative data collection techniques. The descriptive survey design was appropriate for describing the current state of Computer Studies implementation in selected schools and identifying challenges faced by various stakeholders (Creswell & Creswell, 2017).

2. Study Area
The study was conducted in Kasama District, Northern Province of Zambia. Kasama is the provincial capital with a mix of urban and rural characteristics. The district has several public day secondary schools facing various resource constraints common to rural Zambian educational institutions.

3. Target Population and Sample
The target population comprised all public day secondary schools in Kasama District. Using purposive sampling, five schools were selected based on their accessibility, willingness to participate, and diversity in terms of location and school characteristics. The sample included:

- 5 head teachers
- 15 subject teachers (3 from each school)
- 250 pupils (50 from each school)

4. Data Collection Instruments
Data were collected using

- Questionnaires: Semi-structured questionnaires were administered to teachers and pupils to gather quantitative and qualitative data on challenges, resources, and perceptions regarding Computer Studies.
- Interview Guides: Face-to-face interviews were conducted with head teachers to gather in-depth information about school-level challenges and management strategies.
- Document Analysis: School records, including examination results from the Examinations Council of Zambia (ECZ), were analyzed to assess academic performance trends.

5. Data Analysis
Quantitative data were analyzed using descriptive statistics, including frequencies, percentages, and means. Qualitative data from open-ended questions and interviews were analyzed using thematic analysis, identifying patterns and themes related to the research objectives (Braun & Clarke, 2006).

6. Ethical Considerations
Ethical approval was obtained from the relevant institutional authorities. Informed consent was secured from all participants, and participation was voluntary. Confidentiality and anonymity were maintained throughout the research process.

IV. FINDINGS AND DISCUSSION

1. Challenges in Teaching and Learning Computer Studies
The findings revealed numerous challenges affecting the teaching and learning of Computer Studies in the selected schools:

Shortage of Computers and Infrastructure
All five schools reported significant shortages of computers. The pupil-to-computer ratio ranged from 3:1 to 4:1 in some schools, with only one school achieving a ratio of 2:1. These ratios fall far below the recommended standards and severely limit practical learning opportunities. Head teachers cited inadequate funding as the primary obstacle to acquiring sufficient computers.

Inadequate infrastructure, including the lack of dedicated computer laboratories, was also identified as a major challenge. In three of the five schools, Computer Studies lessons were conducted in ordinary classrooms without proper electrical installations or secure storage facilities. This situation increased the risk of equipment theft and damage, further exacerbating resource constraints.

Shortage of Teaching and Learning Materials
Teachers reported significant shortages of textbooks, teaching aids, and supplementary materials for Computer Studies. Most schools had fewer than five textbooks available for classes of 40-90 pupils, making it impossible for learners to access reference materials outside class hours. The lack of teaching aids, including charts, software programs, and multimedia resources, was also highlighted as a constraint to effective instruction.

Inadequate Furniture
Overcrowded classrooms with insufficient furniture were identified as a challenge across the sampled schools. While School A had 40 pupils per class, Schools B, C, and D reported class sizes of 60, 80, and 90 pupils respectively. The shortage of chairs meant that some pupils had to sit on the floor or share chairs, creating uncomfortable learning conditions that affected concentration and participation.

Teacher-Related Challenges
Teacher absenteeism and late coming were reported in all schools, disrupting lesson schedules and reducing instructional time. Some teachers lacked adequate training in Computer Studies, leading to weak explanations and limited ability to address practical challenges during lessons. The study also found that some teachers were not sufficiently prepared before lessons, resulting in ineffective delivery of content.

Crowded Curriculum and Time Constraints
Teachers expressed concerns about the crowded curriculum, which made it difficult to cover the Computer Studies syllabus adequately within the allocated time. The practical nature of the subject requires hands-on experience, but limited computer access and large class sizes reduced individual practice time.

2. Pupil-to-Computer Ratio
The study established varying pupil-to-computer ratios across the selected schools. School A had a relatively favorable ratio of 2:1 (two pupils per computer), while Schools B, C, and D had ratios ranging from 3:1 to 4:1. School E reported the most challenging ratio of 5:1. These findings indicate significant disparities in resource

allocation among schools in the same district, reflecting broader inequities in the Zambian education system.

The high pupil-to-computer ratios have direct implications for practical learning. With limited access to computers, pupils struggle to develop hands-on skills essential for understanding programming concepts, software applications, and data management. This practical deficit undermines the objectives of introducing Computer Studies as a practical subject preparing learners for technology-based careers.

3. Academic Performance in Computer Studies
Analysis of ECZ examination results revealed concerning trends in academic performance between 2016 and 2017. Generally, there was a decrease in performance among highly performing schools and only slight improvement in poorly performing schools. This general decrease in performance can partly be attributed to the increasing challenges facing learners, including limited computer access, overcrowded classrooms, and inadequate teaching and learning materials.

The following table summarizes the performance trends:

- School 2016 Performance 2017 Performance Trend
- School A High Moderate Declining
- School B Moderate Moderate Stable
- School C Low Low Slight Improvement
- School D Low Low Slight Improvement
- School E Very Low Low Slight Improvement

The findings suggest that performance is generally affected by the quality of resources and teaching conditions. Schools with better resources and smaller class sizes tended to achieve better results, reinforcing the importance of addressing infrastructure and resource challenges.

4. Measures for Enhancing Teaching and Learning
Based on the findings, several measures were identified to enhance Computer Studies delivery:

Resource Mobilization and Infrastructure Development
Head teachers recommended prioritizing the procurement of computers, furniture, and teaching materials. Schools were encouraged to engage the private sector through Public-Private Partnerships to access additional resources. Companies operating in local communities could be brought on board to support educational initiatives.

Teacher Capacity Building
Recruiting more trained teachers and providing in-service training for existing teachers was identified as crucial. Training should focus on both technical competencies in Computer Studies and pedagogical skills for effective technology integration. Teachers expressed willingness to participate in professional development programs to improve their delivery.

Classroom Management and School Organization
Schools were advised to address overcrowding by improving classroom organization and exploring alternative scheduling arrangements. The establishment of spacious computer laboratories was recommended to accommodate all learners comfortably and promote concentration.

Curriculum and Pedagogy Enhancement
Teachers emphasized the need for improved lesson preparation and simplification of content to address the challenges of large classes and limited resources. The use of alternative teaching strategies, including peer tutoring and small group work, was suggested to maximize learning opportunities despite resource constraints.

V. CONCLUSION AND RECOMMENDATIONS

1. Conclusion
This study investigated the challenges faced in the adoption of Computer Studies in five selected public day secondary schools in Kasama District, Zambia. The findings reveal significant challenges that undermine the effective implementation of this important subject. Key challenges include shortage of computers, inadequate teaching and learning materials, overcrowded classrooms, teacher absenteeism, limited trained teachers, and insufficient furniture.

The pupil-to-computer ratio varies considerably among schools, with most schools having ratios exceeding recommended standards. This situation limits practical learning opportunities and affects academic performance. Analysis of ECZ examination results indicates generally declining performance, partly attributable to the resource and teaching challenges identified.

Based on these findings, it is evident that while Zambia has made policy commitments to integrating ICT in education, substantial gaps exist between policy and implementation. Addressing these gaps requires coordinated efforts from government, schools, communities, and private sector partners.

2. Recommendations
Based on the study findings, the following recommendations are proposed:

Government Level

- Increase budgetary allocation to the education sector, with specific funding for ICT infrastructure in rural schools.
- Ensure timely disbursement of funds to schools to facilitate procurement of computers and teaching materials.
- Develop and implement a comprehensive teacher training program for Computer Studies.

- Establish a national ICT in education policy with clear implementation guidelines and accountability mechanisms.

School Level

- Head teachers should prioritize procurement of teaching and learning materials for Computer Studies.
- Schools should establish Public-Private Partnerships with local companies and organizations to support ICT resources.
- Schools should implement strategies to reduce overcrowding, including classroom expansion and scheduling adjustments.
- School administrations should enforce teacher attendance policies and support lesson preparation.

Teacher Level

- Teachers should engage in continuous professional development in Computer Studies.
- Teachers should prepare adequately before lessons and simplify content to address constraints.
- Teachers should adopt innovative teaching strategies to maximize learning despite resource limitations.

Community and Stakeholder Level

- Communities should support schools through resource mobilization initiatives.
- Alumni associations and local businesses should contribute to school ICT infrastructure development.
- NGOs and development partners should prioritize support for Computer Studies in underserved areas.

3. Suggestions for Further Research

This study focused on five schools in Kasama District, limiting the generalizability of findings. Future research should expand the scope to cover a wider range of schools and districts. Studies could also explore the impact of alternative ICT integration models, including mobile learning and low-cost technology solutions, which may be more appropriate for resource-constrained contexts.

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