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Original Article

The Role of ICT Tools in Mitigating Data Reporting Inaccuracies Among Headteachers of Public Basic Schools in the Five Kwahu Districts, Ghana

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Abstract

Timely and accurate reporting of data is highly critical to efficient planning, monitoring, and decision-making in education. Despite this, Ghana's public basic schools continue to be plagued by data inaccuracies that inhibit policy implementation. The aim of this study was to investigate the use of Information and Communication Technology (ICT) tools in mitigating data reporting inaccuracies among headteachers in the Five Kwahu Districts. Specifically, it identified the ICT tools used for data reporting, assessed the relationship between ICT proficiency and data accuracy, and examined the underlying factors that contribute to inaccuracies in school data reporting. A descriptive cross-sectional survey study design was employed, and data were gathered from 321 headteachers using structured questionnaires. The study findings indicated that although Microsoft Excel and the GESMIS app were widely utilised by the headteachers, their effectiveness was hindered by various challenges, including inadequate ICT training, lack of equipment, unstable internet connectivity, and complex reporting forms. Additionally, limited ICT skills and technical assistance, faulty ICT tools and insufficient time were among the factors that contributed significantly to data entry errors. While the study found a positive correlation between ICT proficiency and reporting accuracy, it was not statistically significant. The study underscores the need to enhance ICT capacity, simplify data reporting templates, and provide institutional support in order to reduce errors in reported data. To improve data reporting systems in the basic schools across the Kwahu Districts, targeted professional development and infrastructure investment are recommended.

KEYWORDS: ICT tools, data management, data reporting and accuracy, headteachers, basic education, Ghana

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1.0 INTRODUCTION

The 21st century has seen rapid advances in the application of Information and Communication Technologies (ICTs) across various sectors of the global economy, changing how data is collected and processed (Dobrica et al., 2023; Orhani et al., 2024; Timotheou et al., 2022; World Economic Forum, 2020). In the educational sector, ICT plays a critical role in data-driven decision-making, especially with respect to resource management and performance tracking (Lai & Bower, 2019; Selwyn, 2021). As a result, ICT integration in educational management systems has been identified as one of the key strategies for achieving Sustainable Development Goal 4 (SDG 4) (UNESCO & Global Partnership for Education, 2020). Finland and Singapore are examples of countries that have been able to leverage ICT-based educational management systems successfully, highlighting how real-time data can enhance the performance of resource management in schools and student outcomes (Lempinen et al., 2024; Serdyukov, 2017).

In Ghana, the Ministry of Education, through the Ghana Education Service under the Metropolitan, Municipal, and District Education Directorates, operates the Education Management Information System (EMIS). This system is designed to coordinate the collection and reporting of essential school data—including school profiles, enrolment figures, infrastructure details, and inventories (Danso et al., 2021; Ocak & Efe, 2020). Although the reported data guides policymaking and resource management, its integrity faces threats because of persistent incorrect data. The Ghana Learning Radio-Reading Programme serves as an example of the problems that arise when dealing with reported data. The distribution of learning materials proceeded according to data provided by headteachers regarding their student enrolment numbers. The distribution of supplies became unbalanced because many child enrolment counts were inflated by headteachers (Ghana News Agency, 2020). The situation underscores the critical need to develop improved data reporting systems that combine fairness with efficiency, as incorrect reports lead to flawed educational policy decisions and resource distribution, ultimately damaging the performance of the entire educational system.

The implementation of ICT in educational management has been more effective in developed countries, while developing nations encounter significant challenges (Eleku et al., 2022). The incorporation of ICT in Ghanaian education has demonstrated progress but encounters challenges stemming from unreliable data reporting by schools, inadequate digital infrastructure, and the limited ICT competencies of school administrators (Ampofo et al., 2020; Danilova, 2024; Gyaase et al., 2020; Nettey et al., 2023). The process of submitting electronic data to headquarters by basic school staff takes a long time, causing delays at every level from schools to district offices (Ledgerwood, 2009; Ogunode et al., 2021; Rathore, 2022; Waheed et al., 2020).

1.1 Educational Data Reporting and ICT Adoption Challenges in Sub-Saharan Africa

Sub-Saharan developing countries' accurate reporting of education data is impeded by poor infrastructure, very minimal ICT training experiences, as well as continued reliance on manual systems of recording (Gbadebo, 2024; Simwaka et al., 2023). Leta et al. (2024) agree on this by highlighting the preferences given to the intensive use of paper-based data report systems in the

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institutions of learning on the continent. The constant use of manual systems leads to inefficiencies, duplication of efforts, and more avenues for the inaccuracies of data.

A lack of ICT skills of educational personnel, particularly due to a lack of proper training and proper access to ICT tools, is one of the primary barriers to the improvement of the quality of educational data (Leta et al., 2024). Similarly, Ayunar et al. (2024) and Golodov et al. (2022) document ongoing digital skill gaps among education workers, attributing them to insufficient training experiences. In addition, technical challenges—such as unstable internet connectivity, outdated equipment, and complex system requirements, further constrain the adoption of ICT for effective data management (Golodov et al., 2022).

1.2 Causes of Data Reporting Errors in Educational Institutions

Data reporting errors in educational settings often result from the interplay between individual-level challenges and systemic organisational weaknesses. In the Kuria District, Kenya, for instance, administrators reported difficulties such as computer breakdowns, lack of staff training, and inadequate ICT resources, all of which hinder accurate data entry and management (Omwenga & Meremo, 2019).

Accurate report generation depends on three key elements: digital proficiency, technical support, and analytical skills. Unfortunately, many school administrators possess below-average digital literacy, which directly impairs their ability to navigate data systems and generate reliable reports. These deficiencies are often exacerbated by insufficient training and frequent staff turnover (Wambua et al., 2023). Moreover, the availability of standardised templates and data formats significantly affects reporting consistency. In many institutions, inconsistent data entry procedures and the absence of harmonised formats contribute to integration and analysis errors (UNESCO, 2023).

Digital illiteracy among school administrators remains a critical barrier to accurate data handling. In Kitui County, Kenya, a study found that the majority of administrators did not use computers regularly, indicating a substantial skills gap in digital operations (Wambua et al., 2023). These issues are further compounded by limited access to digital literacy resources and ongoing professional development. Organisational shortcomings, particularly in ICT infrastructure and support, play a significant role in data reporting challenges. Inadequate hardware, unreliable internet connectivity, and a lack of technical personnel mean administrators often face delays or errors in submitting data (Omwenga & Meremo, 2019). Furthermore, repeated manual data entry across different systems without synchronisation increases the likelihood of mistakes (UNESCO, 2023).

1.3 ICT Tools and Their Potential to Mitigate Data Inaccuracies

ICT tools have been found to possess a high potential for mitigating data inaccuracies in educational reporting if appropriately utilised. The tools enable the ease of collecting data, involve validation processes, and provide instant reporting, all of which combine to enhance the credibility of educational data and enable evidence-based decision-making (Gustafsson-Wright et al., 2022; Sunarjo, 2024).

In Kenya, the Ministry of Education used the National Education Management Information System (NEMIS) to address longstanding problems such as ghost students, delayed reporting, and inconsistencies in school census data. The application of NEMIS led to improved records of student enrolment, improved targeting of capitation grants, and faster access to core data by national and district authorities (Bisieri, 2021; Khaemba et al., 2022). Real-time validation functionalities built into the system allowed administrators to identify and rectify errors in real time, eliminating data tampering.

The South African School Administration and Management System (SA-SAMS) implementation has also been able to attest to ICTs ability to revolutionise the routine process of handling data. SA-SAMS computers automate vital functions in the schools and provide an expansive system of guaranteed, accurate and harmonised reporting by all nine provinces (Khuto, 2024). There have been instances where institutions employing SA-SAMS recorded fewer duplicate enrolment data and performance tracking mistakes owing to automated validation systems and built-in reporting features (Dlomo et al., 2024).

In Ghana, the use of the Mobile School Report Card (mSRC)—an Android application designed by the Ghana Education Service with technical assistance from UNICEF—has improved data quality in pilot schools. The mSRC facilitates the capture of real-time data on target indicators like enrolment, attendance, and basic school performance indicators. Pilot deployment in 20 districts was reported to demonstrate considerable improvement in timeliness and accuracy of data submission and support better-informed planning and monitoring by education authorities (Ghana Education Service & UNICEF, 2018). As it expands, the system can have the capacity to become a primary source of solutions for long-term reporting problems within the basic education sector. Data collected by mSRC is eventually fed into Ghana's national Education Management Information System (EMIS) and in this sense is serving as a bridge between school-based reporting of statistics and national education planning (Abdulai et al., 2018).

These instances demonstrate that ICT tools, with the support of users' requirements and supplemented with training and infrastructure investment, can greatly enhance data accuracy in education systems. The achievements of NEMIS, SA-SAMS, and mSRC confirm that the effective use of such ICT tools, with real-time validation and continuous support to users, can revolutionise data collection and reporting by schools, avoiding errors and improving the quality of education statistics.

1.4 Key Lessons from Advanced Countries in ICT Adoption for Educational Data Management

Established education systems like Finland, Singapore, and South Korea provide valuable experience in the effective use of ICT to manage educational data, to which lower-resource environments' strategies can be aimed. In Finland, KOSKI is an electronic platform developed by the Finnish National Agency for Education. It is a centralised digital platform that brings together data from the schools, municipalities, and state agencies. It maintains consistency and traceability of student records, enrolment figures, and performance indicators nationwide (Finnish National

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Agency for Education, 2021). The convenience of KOSKI is its interoperability and user-friendly interface that eliminates reporting faults and enhances efficiency at all administrative levels.

Singapore's Student Learning Space (SLS) employs artificial intelligence to facilitate real-time monitoring of student performance. SLS empowers teachers and policymakers to make evidence-based decisions in curriculum content and support processes for students (GovTech Singapore, 2023). SLS's application of predictive analytics is a demonstration of how real-time data can be used not only to report but to inform education planning responsively.

In South Korea, the national ICT strategy is meant to establish effective data systems and human capacity. A considerable amount of funds is invested by the government in continuous professional development for administrators and teachers for them to gain digital skills, which can help them utilise and manage education data systems (Choi, Chung, & Ko, 2021). This is reinforced by clear policy guidance that is driven by data protection, precision, and public accountability, and therefore high trust levels in education (UNESCO, 2023).

Taken together, these systems reaffirm some sound lessons: there needs to be interoperable digital platforms, there is decision-making potential in real-time analysis, and there has to be ongoing professional development to ensure user competency. These practices, although expensive, demonstrate that significant improvements in data quality are achievable when technology adoption is supported by strong institutional backing and user empowerment (Choi et al., 2021; UNESCO, 2023).

1.5 Educational Data Reporting and Future Potential of Emerging ICT Technologies

Emerging technologies such as Blockchain and Artificial Intelligence (AI) can help restructure education data reporting systems to make them efficient, accurate, and transparent. AI technologies can carry out information verifications, detect anomalies, and assist with predictive analytics (Rapid Innovation, 2024; Reichman, 2024). Similarly, Sajja et al. (2023) experienced a learning analytics system in GPT-4 that tracked learner activity and assessed instruction effectiveness in real time. All these are reflective of the extent to which AI not only improves the quality of data collected but also enables timely intervention and response in educational systems.

Blockchain technology is also highly promising in enhancing security and integrity for educational data. Awaji and Solaiman (2022) designed a blockchain system for handling students' success records in higher institutions using Ethereum and smart contracts for creating immutable, authentic, and untampered digital records. Their work surpassed traditional systems in both reliability and functionality. Other than that, Liu et al. (2023) proposed EduChain, a consortium blockchain network with database consistency and educational records immutability. It consists of private and consortium blockchains and facilitates secure authentication of certificates and traceable data exchanges.

Implementing these technologies in the Ghanaian education system, and especially in Ghana’s five Kwahu Districts, has the potential to solve long-standing problems like inflated enrolment reporting, late submission of reports, and limited availability and reliability of data. Once embedded in platforms like EMIS or the Mobile School Report Card (mSRC), Blockchain and AI

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technologies can potentially build a more compact and look-to-the-future data setting. That being said, their implementation would still require investment in digital infrastructure, user training, and policy harmonisation to achieve long-term sustainability.

1.6 Theoretical Framework: Task-Technology Fit Model

The Task-Technology Fit (TTF) theory, propounded by Goodhue and Thompson (1995), offers a theoretical explanation of how the compatibility between technology and tasks determines the performance outcomes. The TTF theory suggests that technology will enhance performance only when it is properly aligned with the task which users are supposed to perform and when users have the requisite skills to efficiently apply it.

The TTF model is important for this research because it highlights the need for ICT tools to match the specific reporting tasks of basic school headteachers. For example, ICT tools like Mobile School Report Cards (mSRCs) must be designed to simplify the gathering, verifying, and reporting of school data in a simplified manner. If the tools are too complex to use or do not address specific challenges headteachers may encounter, such as infrastructure deficits, they are unlikely to improve data accuracy. The TTF model also implies the level of user capabilities–even proven technologies will not work if headteachers do not possess the skills to implement them.

Thus, TTF provides the lens through which this research investigates how ICT tools meet the data handling requirements of the Kwahu Districts' basic schools. In considering the extent to which the tools match the activities at hand and their users' level of competencies, this research targets the identification of limitations and potential in leveraging ICT usage for the improvement of data report accuracy.

1.7 Gaps in Existing Literature

While ICT adoption in education has been extensively researched globally and in Ghana, the most significant research work has been conducted in teaching and learning processes at the secondary or tertiary levels, often located within urban and resource-rich settings (Buabeng-Andoh, 2012; Ampofo et al., 2020). The research gap persists in establishing how ICT tools impact administrative processes, particularly data reporting culture at the basic education level. This is crucial, as accurate information about basic schools is the pillar of national educational planning and monitoring.

Additionally, ICT and educational management research in Ghana has mainly concentrated on systems-level tools like EMIS, rather than critically analysing the use of tools like the Mobile School Report Card (mSRC) or GESMIS App by school-level managers, particularly headteachers in rural or underprivileged communities. These shortcomings are further compounded in the Five Kwahu Districts, where some of the infrastructural and capacity-related challenges may influence ICT adoption and report accuracy. As Gamboa and Gutierrez (2021) note, there is not much empirical literature on the use of ICT and administrative decision-making in Sub-Saharan Africa's basic education. This study addresses the gap through an understanding of the applications of ICT

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used in reporting data, constraints hindering the application by the headteachers, and the environment influencing accuracy and efficiency in school-level reporting systems.

This research is concerned with data reporting capabilities – an important, but previously underemphasised, aspect of the educational management function. It enriches literature on schools' ICT integration with empirical evidence for policy and professional development interventions with a possibility of improving implementation of educational data systems in Ghana. The Kwahu Districts of Ghana provide a suitable context for understanding the issues afore-discussed since they include areas that vary between urban, semi-urban and rural areas (Ghana Statistical Service, 2021). The headteachers in these districts face peculiar challenges in terms of reporting the required data because of inadequate ICT skills and limited access to technology, as well as strict ministry rules (Buabeng & Amo-Darko, 2024). These factors significantly reduce data accuracy and usefulness.

This study aimed to: (1) identify the ICT tools used for data reporting by public basic school headteachers in the Five Kwahu Districts, taking into account the specific tools available and their frequency of use across various school settings; (2) assess the relationship between the ICT proficiency of public basic school headteachers in the Five Kwahu Districts and the accuracy of the data they report in order to understand how digital skill levels affect the quality and reliability of school-level data submitted to educational authorities; and (3) examine the issues and underlying factors that contribute to inaccuracy in school data reporting by public basic school headteachers in the Five Kwahu Districts, with a focus on infrastructure constraints, reporting system inefficiencies, and headteachers' ability to manage digital reporting tools.

2.0 METHODS

2.1 Participants

This study targeted 441 headteachers of public basic schools in the Kwahu Districts of Ghana, employing a census sampling technique to ensure complete coverage by inviting every headteacher to participate. A total of 321 headteachers from the target population participated in the survey, which resulted in a response rate of 72.8%. Distribution of the respondents by the five Kwahu Districts is as follows: Kwahu Afram Plains South (22.4%), Kwahu West (22.1%), Kwahu Afram Plains North (21.5%), Kwahu South (18.7%), and Kwahu East (15.3%). Female headteachers outnumbered their male counterparts, comprising 51.1% of respondents, indicating a near-equal gender distribution. This near-equal gender distribution is a sound foundation for a fair analysis of ICT usage and reporting practices.

The majority of the headteachers were aged 41–50 years (57.9%), followed by the 31–40 years age group (37.7%). Only 3.7% were aged between 51 and 59 years, and 0.6% were aged between 20 and 30 years. The age distribution suggests that the majority of the headteachers are in their middle-aged working years, with a considerable number of years of working. Regarding qualifications, the overwhelming majority had a bachelor's degree (89.4%), followed by a smaller percentage who had a master's degree (7.8%). Fewer headteachers possessed a diploma (2.5%) or a 3-year post-secondary certificate (0.3%). The findings indicate an extremely well-educated sample of respondents.

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In terms of work experience as a head, the vast majority of the headteachers indicated 6–10 years (54.8%, 176 participants), followed by those indicating 3–5 years (33.3%, 107 participants). Fewer headteachers (8.7%, 28 participants) indicated over 11 years of experience, while only 3.1% (10 participants) indicated 1–2 years. This suggests that most of the participants are experienced professionals with long service. Concerning ICT proficiency, the majority of the headteachers identified themselves as beginners (42.1%), followed by 28.7% who rated themselves as intermediate, and 29.2% (94 respondents) who identified themselves as advanced.

2.1.1 Inclusion and Exclusion Criteria

The inclusion criteria for this study required that participants be in-service headteachers from public basic schools in the Kwahu Districts who have had at least one year of experience working in their positions and be on active duty with the responsibility to submit data to the EMIS. All headteachers of private or non-governmental schools and headteachers from public basic schools who were on leave or were absent during the period of data gathering were excluded from the study. Furthermore, the study excluded the headteachers who participated in the instrument's pretesting.

2.2 Procedure

The research data was collected over two months using a hybrid data collection strategy, which included in-person and online surveys. The rationale for choosing this specific methodology was due to the fact that some participants faced internet connectivity issues. The face-to-face questionnaires were carried out by trained research assistants who visited the schools to hand-deliver and retrieve filled-in questionnaires. For those who were well-connected with fast internet speeds, an online alternative was also available through Google Forms (Google Inc., Mountain View, CA). Before conducting the survey, the participants were informed about the purpose of the study and given an assurance that their answers would be kept anonymous. They were also told that they could voluntarily participate and leave at any point without incurring any penalty. Their participation, therefore, amounted to informed consent. Permission to conduct the study was obtained from the various Municipal Education Directorates in Kwahu before the study began.

2.3 Data Collection Instrument

In order to investigate the use of ICT tools in reducing data reporting errors among the headteachers, the study utilised a guided questionnaire with several sections that were in line with the objectives of the study. The authors, after conducting a comprehensive literature review, developed the survey items that aimed to solicit in-depth information on participants' demographics, ICT tools for data reporting, levels of ICT proficiency, factors leading to errors in data reporting, and challenges they face in data reporting.

Both paper-and-pencil and online versions of the questionnaire were developed. To ensure validity and applicability, the instrument was reviewed by three experienced researchers with expertise in educational administration and management, measurement and evaluation, and ICT. The comments of the panel led to the revision to make the items in the survey clearer and aligned with the study goals. Apart from this, the survey items were pretested with 10 headteachers (two from each of the Kwahu Districts) to ensure the instrument's validity and clarity. Feedback from the participants necessitated rewording of some of the survey items for clarity and precision. Below are the key aspects of the survey instrument.

Demographical data, such as age, sex, education, years of headship experience, and district affiliation, were gathered to serve as background for the findings. To ascertain the extent to which participants utilised ICT tools in carrying out data reporting processes, they were asked to rate their use of specific tools such as MS Excel, GESMIS App, Kobocollect App, GES PLC App, mSRC App, Annual Schools Census EMIS Portal, Google Forms, and ODK Collect App, using a 5-point Likert scale with responses ranging from 1 (Never) to 5 (Very Frequently). An example of a question was: "How often do you utilise MS Excel in reporting data?"

Participants' ICT proficiency was assessed using a single-item measure, where they were asked: "How would you rate your ICT proficiency?" Responses were recorded on a three-point Likert scale: 1 = Beginner, 2 = Intermediate, and 3 = Advanced. Similarly, data accuracy was measured using a single-item binary question: "Have you ever encountered errors in your school's data reporting?" Participants responded with either Yes (1) or No (2), indicating whether they had experienced data reporting errors. This measurement approach provided a direct assessment of participants' self-reported ICT competency and their experiences with data accuracy in school reporting.

The study also focused on identifying the primary causes of data reporting errors by headteachers. This was done through a series of items that examined factors such as lack of proficiency in ICT, faulty ICT tools, unclear templates, insufficient time for data reporting tasks, and limited technical support with which they were provided. Participants rated their agreement with the items on a 4-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree).

The study was also designed to identify barriers to successful ICT adoption by these items measuring barriers such as restricted access to ICT tools, poor internet connectivity, insufficient training, redundancy in data requests, interruptions from frequent software updates, difficulty in combining multiple data sources, and unclear reporting templates. Participants rated their agreement with them on a 4-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree).

The internal consistency of the subscales, as measured by Cronbach's alpha, shows a strong reliability on average. ICT Utilisation in Data Reporting ($\alpha = 0.92$) and the Challenges in Data Reporting ($\alpha = 0.96$) demonstrate an excellent level of internal consistency, indicating a strong correlation among their respective items on the given related sub-scales. Along with this, the Causes of Data Reporting Errors subscale shows an acceptable level of reliability with an internal consistency of $\alpha = 0.75$ (Field, 2024; Hair et al., 2019; Tavakol & Dennick, 2011).

2.5 Statistical Analysis

We performed descriptive and inferential statistical analyses using SPSS on the data collected from headteachers within the Kwahu Districts. Descriptive analyses included the calculation of frequencies, percentages, means, and standard deviations to summarise demographic characteristics, ICT utilisation levels, and challenges in data reporting. These analyses helped give descriptions of the distribution of participants based on age, gender, educational background, teaching experience, and ICT proficiency.

A Pearson correlation analysis was performed to assess the relationship between ICT proficiency and the accuracy of data reporting. This inferential analysis showed the strength and direction of the relationship between headteachers' competency in ICT and their ability to report school data accurately. For constructs

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with multiple items, such as ICT use and challenges to data reporting, the total scores were found by adding up the answers on the Likert scales. We computed and ranked the mean scores of the barriers that hinder data reporting, including limited ICT proficiency, unclear templates, redundant requests for data, and poor internet access.

The statistical analyses provided a structural insight into the extent of ICT adoption, proficiency gaps, and systemic inefficiencies affecting headteachers' ability to collect and report accurate school data. The findings were interpreted in light of the study's objectives and how they relate to literature in order to provide a comprehensive and data-driven analysis of the use of ICTs in data reporting in the Kwahu Districts.

3.0 RESULTS

This part presents the results of the study based on the three general objectives: determining the ICT tools used by headteachers for reporting data, assessing the ICT skills and data accuracy relationship, and examining the problems and cause factors of inaccuracy in basic school reports. The results are presented in subsections aligned with each of the research aims and complemented with related statistical data based on the responses of the 321 heads of schools that took part. Descriptive statistics were employed to assess ICT tool usage trends and reporting difficulties, while inferential statistics were employed to examine ICT proficiency-reporting accuracy correlations. These results present data-driven accounts of the situation as it currently is concerning ICT use when handling data in the public primary schools of the Five Kwahu Districts.

3.1 ICT Utilisation in Data Reporting Processes

The study examined the ICT tools used by headteachers in data reporting. Table 1 is a summary of the mean and standard deviation of the frequency of usage of the ICT tools. Of the tools involved, MS Excel and GESMIS App ranked as the most frequently used tools for data reporting, with mean scores of 3.14 (SD=1.42) and 3.14 (SD=1.44), respectively. There is less frequency of the usage of Google Forms and ODK Collect, with a mean of 3.02 (SD=1.41) and a mean of 3.03 (SD=1.42), respectively. The overall results imply that ICT use across tools is at moderate levels, most likely due to a combination of training, accessibility, and technological knowledge. This suggests an urgent need for intervention in facilitating tool adoption, which suffers from very low uptake, and ensuring equitable access across the districts.

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Table 1: Mean and Standard Deviation of ICT Tool Utilisation

ICT Tool	Mean (M)	Standard Deviation (SD)
MS Excel	3.14	1.42
GESMIS App	3.14	1.44
KoboCollect App	3.12	1.43
GES PLC App	3.08	1.44
Annual Schools Census EMIS Portal	3.06	1.43
mSRC App	3.04	1.43
ODK Collect App	3.03	1.42
Google Forms App	3.02	1.41

Note. N=321

3.2 Relationship Between ICT Proficiency and Data Accuracy

To assess the relationship between ICT proficiency and data accuracy, a Point-Biserial correlation analysis was conducted. As indicated earlier, ICT proficiency was measured on a three-point Likert scale (1 = Beginner, 2 = Intermediate, and 3 = Advanced), while data accuracy was assessed using a binary (Yes = 1, No = 2) response format.

The correlation analysis yielded a weak positive correlation ($r_{pb} = 0.102$, $p = 0.069$, $N = 321$). While the relationship between ICT proficiency and data accuracy was positive, suggesting that headteachers with higher ICT proficiency were slightly less likely to report frequent data errors, the correlation was not statistically significant at the $p < 0.05$ level. These results indicate that ICT proficiency alone may not be a strong determinant of data accuracy. Other factors, such as reporting workload, data entry processes, or external technical support, could also play a role in determining the accuracy of school data reporting.

3.3 Challenges and Underlying Factors Contributing to Data Reporting Inaccuracies

The participants classified their challenges with ICT reporting tools into several major challenges as presented in Table 3. Of all the challenges, limited access to ICT tools ranked as the most challenging (M = 2.96, SD = 1.44). This was closely followed by redundant requests for data (M = 2.92, SD = 1.35) and inconsistent internet connectivity (M = 2.89, SD = 1.42), both of which resulted in inefficiencies in reporting data. Moreover, the respondents viewed the difficulty in consolidating multiple sources of data (M = 2.89, SD = 1.45) as one of the important challenges, implying that systems' failure to interoperate deprives data management activities. Lack of uniform reporting formats (M = 2.88, SD = 1.44) and inadequate ICT training (M = 2.87, SD = 1.46) were also indicated as crucial challenges, implying that inconsistency in data reporting format and lack of user expertise make reporting less effective.

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The other prominent but lower-priority issue was frequent software updates leading to interruptions (M = 2.83, SD = 1.44), indicating that system instability problems can also make it harder to report data. Although the range of means is relatively close, all these issues were rated as major hindrances to the effective use of ICT tools in reporting data. The results confirm that infrastructure-related issues, such as restricted access to ICT tools and weak network connectivity, remain central obstacles to effective data reporting. In addition, inefficiencies in processes, such as multiple requests for data and poorly structured reporting templates, also complicate the process. Furthermore, user capabilities and system-related issues, such as inadequate ICT training and frequent software updates leading to disruptions, were identified as other obstacles. These results support the complex challenges participants face when applying ICT tools for data reporting.

Table 3: Mean Scores and Standard Deviations of Challenges in Data Reporting

Challenge	Mean (M)	Standard Deviation (SD)
Limited access to ICT tools	2.96	1.44
Redundant data requests	2.92	1.35
Poor internet connectivity	2.89	1.42
Difficulty integrating multiple data sources	2.89	1.45
Unclear reporting templates	2.88	1.44
Insufficient ICT training	2.87	1.46
Frequent software updates causing disruptions	2.83	1.44

Note. N=321

The study recorded the headteachers' responses regarding factors contributing to inaccuracies in data reporting using a 5-point Likert scale. Table 4 presents the ranking of these causes based on their mean scores. The results indicated that limited ICT skills (M = 3.09, SD = 1.41) were the most common source of inaccuracy in data. These results suggest that most headteachers do not have the computer skills required to effectively perform data entry, produce reports, and verify records, and, therefore, are likely to have inaccuracies in school data.

Insufficient time to perform data reporting tasks (M = 3.06, SD = 1.40) was also viewed by the headteachers as a major cause of data reporting errors, suggesting that the rigid timetables and other administrative tasks hindered the headteachers' ability to adequately perform their data reporting duties. Apart from this, an inability to read data collection forms (M = 3.05, SD = 1.42) was also identified as a major constraint, implying that ambiguous or incorrect report forms were among the reasons for data entry and interpretation mistakes, which indicates the use of standard and clear-cut forms.

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Table 4: Causes of Data Reporting Errors

Cause	Mean (M)	Standard Deviation (SD)	Rank
Limited ICT proficiency	3.09	1.41	1
Insufficient time for data reporting tasks	3.06	1.40	2
Difficulty understanding data collection templates	3.05	1.42	3
Faulty ICT tools	3.04	1.43	4
Limited technical support	3.01	1.42	5
Miscommunication of data requirements	2.98	1.43	6
Redundant data requests	2.92	1.35	7

Note. N=321

Others pointed out significant concerns as lacking ICT facilities (M = 3.04, SD = 1.43) and lacking technical assistance (M = 3.01, SD = 1.42), which confirms the concern of infrastructure deficits in bringing about errors in reporting. The respondents also indicated that data request miscommunication (M = 2.98, SD = 1.43) and duplication in requests for data (M = 2.92, SD = 1.35) created errors, although to a lesser extent. The heterogeneity in response indicates that ICT support, training, and accessibility at the district level determine the severity of such problems. The headteachers varied from being relatively well-supported to being severely impacted by poor digital training and insufficient infrastructural support.

4.0 DISCUSSION

This study examined the use of ICT tools in data reporting among headteachers and the challenges influencing accuracy in the Five Kwahu Districts. Findings revealed moderate ICT tool usage, with Microsoft Excel and the GESMIS app being most frequently used. However, significant constraints such as limited digital literacy, inadequate technical support, and poorly designed reporting systems affected performance. These findings align with Leta et al. (2024) and Gbadebo (2024), who identified similar infrastructure and skill-related barriers in educational data reporting across Sub-Saharan Africa. The study findings also support the Task-Technology Fit (TTF) model by Goodhue and Thompson (1995), indicating that the successful adoption of ICT depends not only on the availability of tools but also on how well these tools align with user skills and reporting requirements. As Wambua et al. (2023) and Ayunar et al. (2024) confirm, user proficiency is central to performance, yet, on its own, it is insufficient to ensure data accuracy.

Although the correlation between ICT proficiency and data accuracy was weak ($r = 0.102$, $p = 0.069$), these results mirror previous studies. Ahmed (2019) highlighted how system complexity and deadline pressures can significantly affect data quality, while Page (2024) emphasised the negative impact of a lack of data integration. The finding that errors stem from ambiguous templates, overlapping requests, and insufficient time echoes evidence from (UNESCO, 2023). and Young (2023) that systemic inefficiencies are key drivers of inaccuracy. Thus, the weak

correlation suggests that interventions must go beyond digital literacy in order to address systemic reporting inefficiencies.

Moreover, the challenges faced by headteachers—such as delayed submissions due to poor connectivity and the lack of interoperable systems, resonate with experiences from Kenya's NEMIS and South Africa's SA-SAMS. As shown in Bisieri (2021) and Dlomo et al. (2024), tools with real-time validation, simplified templates, and centralised data architecture improve efficiency and minimise error—features still lacking in Ghana's current deployment of tools like GESMIS and mSRC. Furthermore, the integration of AI and Blockchain as future enablers of data integrity, as noted by Rapid Innovation (2024) and Liu et al. (2023), suggests a pathway for Ghana's education sector. These technologies can reduce human error, ensure traceability, and automate validation—yet their success will rely on digital infrastructure, user training, and institutional support (Awaji & Solaiman, 2022; Chikumba, 2024).

Lastly, the lessons from advanced countries like Finland's KOSKI, Singapore's SLS, and South Korea's ICT policies highlight the importance of interoperability, real-time analytics, and sustained professional development (Finnish National Agency for Education, 2021; GovTech Singapore, 2023; Choi et al., 2021). These parallels confirm that improving reporting accuracy requires a comprehensive ecosystem, comprising both human and technological capacity.

4.1 Practical Implications

The findings of this study highlight several critical implications for education policymakers, school administrators, and ICT implementation partners in Ghana. First, there is a need to redesign ICT reporting tools to align more closely with the competencies of headteachers, consistent with the Task-Technology Fit model. Tools such as GESMIS and mSRC apps should be simplified, made more user-friendly, and include built-in error checks and real-time validation features, similar to what has been successfully implemented in Kenya's NEMIS and South Africa's SA-SAMS (Bisieri, 2021; Dlomo et al., 2024).

Second, targeted and continuous digital capacity-building programmes are necessary. Training should not be generic but tailored to reporting-specific tasks, enabling headteachers to perform efficiently without excessive reliance on district-level officers. This approach is supported by models from South Korea, where sustained professional development is integral to national ICT strategies (Choi et al., 2021).

Third, Ghana's education sector should explore the integration of emerging technologies such as AI and Blockchain for data management. These tools offer potential for automating data verification, reducing human error, and increasing transparency (Rapid Innovation, 2024; Awaji & Solaiman, 2022). Pilot initiatives in selected districts could test their applicability before large-scale implementation. Finally, policy designers and implementers should address the infrastructural constraints in rural areas, such as connectivity issues, limited devices, and power

outages. Solutions like mobile-based platforms (e.g., mSRC) should be scaled and optimised to work offline or with minimal data consumption.

4.2 Strengths of the Study

A major strength of this study is its holistic approach to examining ICT integration in data reporting. By addressing ICT proficiency, system-related challenges and reporting accuracy, the study provides a wide-ranging analysis which yields concrete implications for various stakeholders. The use of a holistic approach thus adds an element of accuracy and credibility to the conclusions of the study. The Task-Technology Fit (TTF) theory was a sound theoretical model, forming the foundation of the study's analytical platform. The model appropriately linked ICT proficiency to information accuracy, illustrating that technology uptake is optimal where it matches the capability of the users and task requirements. The theoretical foundation of the research gives the findings increased validity and applicability.

The practical value of the research is another notable strength. The research provides actionable policy recommendations to policymakers, education leaders, and practitioners on the detection of training loopholes, unclear reporting blueprints, and ICT resource deficits. The recommendations provide practical solutions to systemic issues in the reporting of education statistics. Moreover, the learning from the Kwahu Districts is context-specific and of high relevance in low-resource environments. The implications of the findings can be utilised to inform ICT adoption efforts in other similar developing countries in sub-Saharan Africa and the rest of the world. The study also used stringent data analysis techniques, applying descriptive and inferential statistics to ensure that it was reliable. The use of correlation analysis, which further strengthened the research by examining the relationship between ICT knowledge and accuracy of data, though weak and not statistically significant, further improved the strength of the research.

4.3 Limitations of the Study

Even though robust, the research is limited in several ways. The first limitation is that the cross-sectional research design limits causal inference. While the research identifies associations between ICT competence and data accuracy, it cannot specify whether higher ICT competence contributes to better data accuracy directly or if other variables play a greater role. Longitudinal designs should be included in future research so as to have a better hold of causal effects over time.

Secondly, the survey is based on self-report measures, and hence, response bias potential is introduced. The respondents may have overestimated or underestimated their own ICT capabilities and the ICT problems they encounter. Triangulation of measures with objective ICT skill level and ICT-based performance measurement in subsequent surveys would introduce triangulation of reported results. Thirdly, the geographic scope of the research is constrained to the Kwahu Districts and thus potentially limits the generalisability of the results to other settings. Follow-up studies extending over numerous districts or countries would provide a greater perspective on ICT adoption in differing school settings.

Fourth, other variables that have an impact on data accuracy were not investigated by the study, including workload distribution, leadership backing, and provision of real-time technical support. Research into such variables in the future would present a more rounded picture of barriers to accurate data reporting. Finally, the study captures ICT adoption and challenges at one point in time, and as such, it is not possible to represent long-term developments or changing challenges in reporting statistics. It is therefore important that future studies monitor how ICT adoption shifts over time and its dynamic effects on statistical accuracy.

4.4 Directions for Future Studies

Drawing on the research and overcoming the study's weaknesses, future studies should investigate a number of crucial aspects to improve knowledge and ICT implementation in education data reporting. Among the promising areas of research in the future are longitudinal surveys following ICT uptake and data quality over time. It would be illuminating to observe the effect of digital literacy training and investments in infrastructure on reporting data over a long period in order to learn whether ICT skill upgrades persist and how they impact the precision of reporting.

Comparative and cross-national studies are also a key area of research. Research across one region or country would provide a comparative analysis of the ICT adoption approach and problems in various school or institutional settings. This would facilitate the drawing up of practical lessons and adaptable solutions for data management across diverse educational settings with differing levels of ICT adoption.

Experimental designs would be useful in future studies to demonstrate causality. Controlled trials examining the efficacy of ICT training programmes, simplified report tools, or combined data gathering schemes would yield high-grade evidence about which interventions most effectively improve the accuracy of the data. That evidence would provide data-driven counsel to policymakers and education leaders as to how effectively ICT programmes must be executed. Since this research employed a quantitative method, future studies must include qualitative methods to examine headteachers' experiences, challenges, and perceptions in adopting ICT in data reporting. Focus groups and interviews would yield richer contextual information on human and organisational determinants of ICT usage that would yield a more realistic representation of the facilitators and inhibitors of ICT integration.

Future studies should also explore other ICT adoption determinants, including workload allocation, school leadership, and access to real-time technical support. Knowledge of how these determinants affect ICT adoption and data quality would enable more effective interventions to enhance reporting efficiency and reliability. Lastly, another important area for further research is in discovering how improved data and greater educational gains go hand-in-hand. An investigation of how improved data quality through ICT means enhances teacher and student performance and utilisation of resources would give a better rationale for ICT-anchored school management funding. Establishing such connections would put greater emphasis on the overall advantage of

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more accurate data reporting to facilitate informed decision-making and overall educational quality.

Through the exploration of these lines of research, future research will be able to concentrate on developing a more lucid vision for ICT adoption in education, data reporting and evidence-based policymaking. These initiatives will eventually improve data quality, improve decision-making, and improve the accountability of education systems.

4.5 Conclusion

This study examined the role of ICT tools in mitigating data reporting inaccuracies in Ghana's Five Kwahu Districts and found that while such tools are in use, their effectiveness is undermined by a mismatch between technology design and user capacity, infrastructural limitations, and lack of real-time validation mechanisms. These findings contribute to a growing body of research emphasising that effective ICT integration in education administration requires more than tool availability—it demands alignment with user skills, supportive infrastructure, and thoughtful implementation strategies. This study fills a notable gap in Ghanaian literature, particularly at the basic education level, where data quality is essential for national planning but often overlooked.

The experiences from Kenya, South Africa, and advanced countries like Finland, Singapore, and South Korea demonstrate that robust ICT systems, professional development, and real-time analytics can significantly improve data accuracy. Ghana's education system stands to benefit by adapting these lessons to its local context, ensuring that digital tools empower rather than hinder school-level data reporting and decision-making.

DELCARATION

Authorship Contribution Statement:

Joseph Appianing conceptualised and supervised the study, developed the methodology, performed the formal analysis, and participated in drafting and reviewing the manuscript. ***Alhassan Ahmed*** contributed to the methodological design and data analysis, conducted the investigation, participated in the formal analysis, and contributed to the original drafting and revision of the manuscript. ***Godwin Owusu Frimpong*** participated in conducting the investigation, was responsible for data coding, contributed to the formal analysis, and supported the original drafting and editing of the manuscript.

All authors reviewed and approved the final version of the paper.

Data Availability:

The data supporting the findings of this study were collected using a structured questionnaire. Access to the dataset is available upon reasonable request from the author, subject to appropriate ethical approval.

Conflicts of Interest:
The authors declare that there are no conflicts of interest related to this study.

Ethics Approval and Consent to Participate:

This study was conducted in accordance with ethical guidelines for research involving human participants. Ethical clearance was obtained from the relevant Municipal Education Directorates in the Kwahu area prior to data collection. Participation was entirely voluntary. Participants were fully informed about the nature and purpose of the study, and their consent was implied through their decision to participate. They were also assured of the confidentiality of their responses and their right to withdraw at any point without any negative consequences.

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