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Enhancing teacher accountability through technology-based attendance monitoring in public senior secondary schools in Niger state, Nigeria

Shuaibu Idris Gupa
Department of Educational Foundations, School of Education, FCT College of Education Zuba-Abuja, Nigeria,
Email: shuaibugupa@gmail.com

Abstract

Teacher absenteeism is a key factor attributed to poor performance of student in Nigerian public secondary schools. This study investigated teacher accountability through technology-based attendance monitoring in -funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria. A mixed-methods approach was employed, combining descriptive surveys design, interviews, and observations. The population comprises of all the 254 government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria. A sample of 350 participants was choosing which comprised of 50 principals, 50 vice principals, 100 teachers and 150 students which were selected using random sampling technique. A Random sampling methodology was employed to identify a representative sample of 50 government-funded senior secondary educational institutions that will give a better focus of the research while a deliberate selection methodology, based on predefined criteria, was employed to determine the precise number of participants because the researcher felt the participants will provide accurate response to the research questions. The instrument for data collection was researcher's structured questionnaire title: Integration of Technology for Monitoring Teachers' Attendance Questionnaire (ETATTBAM). The questionnaire ETATTBAM was a 4 points Likert scale: Completely Concurred (CC), Partially Concurred (PC), Partially Disagree (PD) and Completely Disagree (CD). The validity of the instrument was ascertained by the experts in measurement and evaluation to established face and contents validity. The reliability index for ETATTBAM, using test-retest and Cronbach's alpha, yielded a value of >0.79, indicating that the instrument is reliable. The data collected was analyzed using mean and standard deviation to answer research questions and t-test was used test null hypothesis one and PPMCC to test null hypothesis two at 0.05 level of significance. The findings of this analysis revealed among others, that there was significant improvement in teachers' attendance after the implementation of technology-based attendance monitoring in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria. The student learning outcomes shows positive relationship with technology-based attendance monitoring because teachers are always on ground to attend to their students. It was recommended that more emphasis be placed on monitoring of teachers so that the standard of education is improved in the state.

Keywords: Teacher Accountability, Attendance Monitory and Technology- based Integration.

Introduction

Teacher attendance is a critical factor in ensuring the quality of education in schools. However, teacher absenteeism remains a pervasive problem in many developing countries, including Nigeria. According to the World Bank, teacher absenteeism rates in Nigeria range from 15% to 25% (World Bank,

2019). This phenomenon negatively impacts student learning outcomes, academic achievement, and overall educational quality. Absenteeism is a key factor contributing to poor student performance in school

World Bank (2019) sees teacher absenteeism as a phenomenon where teachers failed to report at their duty post without genuine reason. Teacher absenteeism is a situation whereby a teacher could not report to school and discharge his/her duties in terms of instructional delivery. Teacher absenteeism can be classified into two:

Excused: Excuse absenteeism is a situation whereby the teacher notifies the authorities of their inability to report to school for one reason or the others (Basiru, 2013). In situations of excused absenteeism, a temporal provision of a substitute teacher is made in some situations; other teachers are made to teach the pupils in their spare time although this is not always effective in our public secondary schools in Niger state.

Unexcused absenteeism is when the teacher fails to notify the authorities in advance and cannot give any tangible explanation for their absence on their duty post (Basiru, 2013). Some of the teachers connive with their friends to help them put their names in attendance register which posed a major challenge for school administrator to be able to opt for their replacement in terms of instructional delivery in their classroom.

A traditional attendance monitoring method which is popularly known as paper-based registers has shown to be inadequate in addressing teacher's absenteeism in our school system today. This method is normally manipulated, inaccurate, and time-consuming. The time book is used in our schools and many other organizations in Nigeria to keep track of lateness and absenteeism of its staff on daily bases (Tamatey, 2016). Teachers are made to write their names, the time they report to school and also made to sign against their entries. This process is repeated when school is over before the teachers leave the school premises. The teachers forge the signature or simply write the initials of the names of their fellow teachers in place of the signature. Some teachers also sign in and leave the school for extended periods and children are left not attended to. However, it helps sometimes in tracking absenteeism among teachers but very problematic and cannot be completely relied on.

Technology-based attendance monitoring refers to the use of digital tools and systems to track and record student attendance in educational institutions. This approach has gained popularity in recent years due to its efficiency, accuracy, and convenience.

Types of Technology-Based Attendance Monitoring:

1) **Biometric Attendance Systems**: Use unique physical characteristics, such as fingerprints or facial recognition, to identify teachers, students and effective record of their attendance (Kumar et al., 2018).
2) **Radio Frequency Identification (RFID) Systems**: Use RFID tags or cards which is used to track teachers, student attendance (Sharma et al., 2017).
3) **Mobile Apps:** Utilize mobile devices to record attendance, often using QR codes or GPS location tracking (Alam et al., 2019).
4) **Web-Based Attendance Systems**: Allow teachers to record attendance online, often using a web portal or learning management system (LMS) (Hussain et al., 2018).

Significance of Technology-Based Attendance Monitoring in our School System is:

1) **Improved Accuracy:** Reduces errors and discrepancies in attendance records (Kumar et al., 2018).
2) **Increased Efficiency:** Automates the attendance recording process, saving time and effort (Sharma et al., 2017).
3) **Enhanced Security:** Provides a secure and tamper-proof record of attendance (Alam et al., 2019).

4) **Real-Time Tracking:** Allows administrators and parents to track attendance in real-time (Hussain et al., 2018).

In education, teachers' absenteeism can not only be a serious problem in our school system but also to our society because when students are left unattended to they tend to involved themselves in an indiscipline act or partook in social vices in the schools which will have serious effect on nation development. A research conducted by Mary (2009) on teacher's absenteeism and the result indicated that higher teacher's absenteeism can lead low performance of the students in the school and can also affects the other teachers because they feel that attendance is not important especially when proper measure is not taken by the school administrators. Due to teacher's absenteeism student lose the desire to learn. Teacher absenteeism has become matter of severe distress internationally and nationally that if the right thing is not done it is going to have a serious impact in education sector (UNESCO, 2005).

Teachers' absenteeism in Nigeria is more prevalent in rural setting where infrastructure and the school facilities such as classroom, learning environment are insufficient. Unfortunately, this can results the low quality education, negative motivation to students, higher dropout rate and low retention rate among students. In survey conducted in 2021 by the government of Nigeria, that the teachers' absenteeism has raised up-to 35% especially in northern part of the country and 22% in province of Punjab (2021). These statistics shows the alarming situation in the northern part of the country which Niger state is inclusive. According to World Bank reports that unlike Nigeria, United States only recorded 5% of teacher absenteeism (World Bank, 2004).

It has clearly shown from different researches conducted that teachers' absenteeism has effects on students learning and performance especially in their internal and external examinations. A study on teacher absenteeism conducted by Wood and Montgno, cited in (Namiti &Ondiek, 2020) the result shows that a large number of teacher's absenteeism has serious effect on student's academic achievements in negative way. Pakistan is a developing country and ranks as 113th among 120 countries of the world and literacy rate is about 58% (AEPAM Pakistan Education Statistics 2017-18). Low literacy is as a result of many reasons which include teachers not going to school to attend to their students, incondusive learning environment. Teacher absenteeism is a major challenge across the jurisdiction. Its implications are very wide ranging from inhabiting teacher/student attendance which lead to draining school resources and increasing time spent on replacing classroom instruction.

In Niger State, the issue of teacher absenteeism is particularly pronounced. A recent study by Niger State Ministry of Education and the result revealed that 30% of educators within the public secondary education sector in Niger State are absent from school between Mondays to Fridays (Niger State Ministry of Education, 2020). This has led to concerns about the impact on student learning outcomes and the overall effectiveness of the education system in the state. The advent of technology-based attendance monitoring systems offers a promising solution to this problem. The lack of effective attendance monitoring systems in Government funded secondary educational institutions in Niger State, Nigeria, contributes to high teacher absenteeism rates, negatively impacting student learning outcomes and educational quality. Despite the critical need for effective attendance monitoring, there is a dearth of research on the integration of technology to address teacher absenteeism in Niger State public secondary schools. This study aims to bridge this gap by investigating the feasibility and effectiveness of technology-based attendance monitoring systems**.** To what extent does technology-based attendance monitoring improve teacher attendance rates in public senior secondary schools in Niger State, Nigeria.

Literature Review

Computerized technology-based Systems with advanced features have been used worldwide over time for management of employee truantism and its impact on secondary school students' academic performance in Oyo State, Nigeria (Akinduyite, Adetunmbi, Olabode, & Bidunmoye, 2013). The study investigates teacher participation and findings revealed that teacher non-attendance rate was 24.7%, lack of motivation, poor working conditions, inadequate administrative support and negative effects and serve as a significant predictor of student academic performance. India has emerged as a global pioneer in harnessing technology to streamline attendance management, exemplified by the Unique Identifier (UID) project, which aims to assign a distinct biometric identifier to every educator in the country's schools (Ramakumar, 2010). Furthermore, India has explored alternative innovative projects, including the development of biometric monitoring systems, inspired by Hangzhou Dianzi University's technology, which empowers instructors to conduct classroom attendance checks, pinpoint absentees, and reintegrate truant teachers into the system.

Hangzhou University, a renowned Chinese institution, has pioneered the implementation of AI-driven attendance tracking solutions, initially adopted by Delhi's judicial courts (Sarda, 2009). Moreover, India has successfully integrated biometric attendance monitoring systems for both students and educators across all schools in one of its states (Namiti & Ondiek, 2020). The Micro-entities frequently encounter obstacles in adopting biometric solutions, primarily due to the specialized nature of readily available authentication tools. Despite their widespread availability, these devices are typically engineered to cater to the unique requirements of specific sectors, such as academia, thereby limiting their adaptability to novel domains, including healthcare (Kirmani, 2017). Conversely, the strategic integration of technology-enabled attendance systems yields substantial benefits, including a notable diminution in teacher absenteeism, enhanced administrative agility, and effective mitigation of premature departures, truancy, and dereliction of duty.

A paradigmatic shift in education management was underway in Saudi Arabia, as the Ministry of Education endeavored to deploy biometric attendance solutions to ensure real-time monitoring of academic institutions across the kingdom (Duflo, Hanna, & Ryan, 2009). Concurrently, the National Biometric Registry of Saudi Arabia pioneered a groundbreaking initiative, establishing a centralized database of citizens, thereby eclipsing other national biometric programs in scope and ambition (Khan, 2010).

Namiti and Ondiek's (2020) exploratory study probed the potential of Biometric Systems to optimize teacher attendance and performance at Karuri High School in Kiambu County. The investigation's findings exposed the inadequacies of traditional attendance management methods, which relied on manual registers, administrative spot checks, and student prefects' records. These conventional approaches were vulnerable to exploitation, including proxy attendance marking, and were often compromised by ineffective policies and record-keeping lapses. Furthermore, the study revealed a pervasive lack of student motivation. The findings underscored the limitations of traditional methods in accurately monitoring teacher attendance, which, in turn, undermined teacher performance. In contrast, the adoption of biometric systems was found to offer a range of benefits for schools seeking to address teacher absenteeism and enhance teacher performance.

A Ghanaian study cited in Namiti and Ondiek (2020) demonstrates the efficacy of biometric attendance systems in mitigating teacher absenteeism in government-funded institutions. The research reveals a remarkable reduction in teacher absenteeism rates in Ghana, from 27% to 11% (www.thebftonline.com, 2014). Nevertheless, the study also highlights the system's vulnerability to disruptions in GSM network technology, which can impede its widespread adoption (Chares, 2009). In

Kenya, the integration of biometric attendance systems in secondary schools remains limited, although select institutions, such as Jamhuri High School and State House Girls, have successfully implemented these solutions. This research seeks to provide empirical evidence on teachers' understanding and perceptions of biometric attendance systems, as well as their implementation in Kenyan schools.

Research conducted in Ghana, cited in Namiti and Ondiek (2020) shows that biometric attendance system holds very good prospect for the management of attendance of teachers employed by the government and they were happy to announce that teacher absenteeism in Ghana had declined from 27 percent to 11% (www.thebftonline.com, 2014). They also realized that the availability of the system is very dependent on the strength and speed of the GSM network technology adopted. That infers that its used can be limited in this regard (Charles, 2009). In Kenya, the biometric attendance system is rarely used in secondary schools though some of the institutions like Jamhuri high schools; State house girls have deployed these methods. Therefore, this research aims at providing empirical data about knowledge of teachers on Biometric attendance system and its implementation on schools. It is against this background that this present research critically examined teacher accountability through technology-based attendance monitoring in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria

Objectives of the Study

1) Examine technology-based attendance monitoring improve teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria and
2) Explore how technology-based attendance monitoring impact student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria

Research Questions

The following research questions raised were answered in the course of the research:

1) Does technology-based attendance monitoring improve teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria?
2) How does technology-based attendance monitoring impact student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria?

Research Hypotheses

H_{01}: There is no significant difference in teacher attendance rates before and after the implementation of technology-based attendance monitoring government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria.

H_{02}: There is no significant correlation between technology-based attendance monitoring and student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria.

Methodology

A mixed-methods approach was employed, combining descriptive surveys design, interviews, and observations. The population comprises of all the 254 government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria**.** A sample of 350 participants was choosing which comprised of 50 principals, 50 vice principals, 100 teachers and 150 students which were selected using random sampling technique. A Random sampling

methodology was employed to identify a representative sample of 50 government-funded senior secondary educational institutions that will give a better focus of the research while a deliberate selection methodology, based on predefined criteria, was employed to determine the precise number of participants because the researcher felt the participants will provide accurate response to the research questions. The instrument for data collection was researcher's structured questionnaire title: Integration of Technology for Monitoring Teachers' Attendance Questionnaire (ETATTBAM). The questionnaire ETATTBAM was a 4 points Likert scale: Completely Concurred (CC), Partially Concurred (PC), Partially Disagree (PD) and Completely Disagree (CD). The validity of the instrument was ascertained by the experts in measurement and evaluation to established face and contents validity. The reliability index for ETATTBAM, using test-retest and Cronbach's alpha, yielded a value of >0.79, indicating that the instrument is reliable. The data collected was analyzed using mean and standard deviation to answer research questions and t-test was used test null hypothesis one and PPMCC to test null hypothesis two at 0.05 level of significance.

Results

The discussion of the results was based on the responses of the respondents on the questionnaire which Mean and Standard Deviation were used to find the average mean of the answer research question.

Research Question One

Does technology-based attendance monitoring improve teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria?

Table1: Does Technology-Based Attendance Monitoring Improve Teacher Attendance Rates in Government-funded Senior Secondary Schools within the Niger State, Nigeria

S/N	Statements	Mean	Standard deviation
1.	Technology integration can Improved accuracy	2.6	.67
2.	Increased teacher efficiency	2.36	.56
3.	Reduced teacher's absenteeism	2.78	.95
4.	Biometric systems, Mobile applications, Online platforms And Artificial intelligence (AI) can improve attendance monitoring	2.64	.94
5.	Current attendance monitoring system is very effective	2.47	.67
6.	Manual register is the currently used for teacher's attendance monitoring	2.94	.72
	Average	**2.63**	**.75**

From the responses of the respondents in Table 1, the result shows that the mean and standard deviations on how technology-based attendance monitoring improves teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria. The average mean is 2.63 with standard deviation .75. Which shows that with the implementation of technology-based attendance monitoring has significantly improved teacher attendance rates in public senior secondary schools in Niger State, Nigeria?

Research Question Two

How does technology-based attendance monitoring impact student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria?

Table 2: How Does Technology-Based Attendance Monitoring Impact Student Learning Outcomes Government-funded Senior Secondary Schools within the Niger State, Nigeria.

S/N	Statements	Mean	Standard Deviation
1.	Technology-based attendance monitoring improve student engagement and motivation	2.85	.83
2.	Technology-based attendance monitoring significantly improved teacher's attendance	2.56	.90
3.	Technology-based attendance monitoring has serious impact on student learning outcomes	2.95	.53
4.	Technology policy decisions on attendance monitoring has influence on educational quality	2.76	.36
5.	Technology-based attendance monitoring help teachers to identify students who is at the risk of poor academic performance	2.71	.84
	Average	**2.77**	**.69**

Similarly, Table 2 revealed that the mean and standard deviation on how technology-based attendance monitoring impacted on student learning outcomes government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria**.** The average mean is 2.77 with standard deviation .69. Signifying that with the implementation of technology-based attendance monitoring in the schools, positive learning outcome was recorded in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria.

Hypotheses Testing

The null hypotheses were tested for significance at 0.05 alpha levels.

Hypothesis One

H_{01}: There is no significant difference in teacher attendance rates before and after the implementation of technology-based attendance monitoring in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria**.**

Table 3: Difference between the Teacher Attendance Rates before Implementation and After the Implementation of Technology-Based Attendance Monitoring in Government-funded Senior Secondary Schools within the Niger State, Nigeria

Variables	N	Mean	SD	t-Cal	*p*-Value	Decision
Before Implementation	150	23.14	5.082	6.930	.000	Rejected
After Implementation	150	33.79	8.478			

P < 0.05 **Source: Fieldwork (2024)**

More so, Table 3 shows that the results of the t-test revealed a statistically significant difference, with scores demonstrating a substantial and noteworthy increased after the implementation of technology-based attendance monitoring with (*M* = 33.79, *SD* = 8.478) than before the implementation of technology-based attendance monitoring with

(*M* = 23.14, *SD* = 5.082), *t*(149) = 6.930, *p* = .000. Thus, a statistically significant difference was observed at the 0.05 alpha levels, indicating a substantial enhancement in teachers' attendance after the implementation of technology-based attendance monitoring. Therefore, Ho_1 which stated that there is no significant difference in teacher attendance rates before and after the implementation of technology-based attendance monitoring in public senior secondary schools in Niger state, Nigeria is rejected.

Hypothesis Two

H_{O2}: There is no significant correlation between technology-based attendance monitoring and student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria**.**

Table 4: Technology-Based Attendance Monitoring and Student Learning Outcomes in Government-funded Senior Secondary Schools within the Niger State, Nigeria

Variables	N	$\bar{x}$	SD	Df	r-Cal	*p*-Value	Decision
Technology-based Attendance Monitoring	200	2.781	0.594	349	0.772	0.000	Rejected
Student Learning Outcomes	150	2.695	0.695				

P< 0.05 **Source: Fieldwork (2024)**

A looking at the results in hypothesis 2 (H_{O2}), Pearson Product Moment Correlation Coefficient was used. The result from the responses of the respondents in Table 4 indicated that technology-based attendance monitoring (Mean=2.781, SD= 0.594), and the correlated student learning outcomes (Mean=2.695, SD= 0.695), r(349)= 0.772, *p* =0.000. Thus, the student learning outcomes shows positive relationship with technology-based attendance monitoring because the p-value is less than 0.05 alpha levels. This coefficient of determination revealed that there was positive relationship between the technology-based attendance monitoring and the correlated student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria. Hence, the null hypothesis which states that there is no significant correlation between technology-based attendance monitoring and student learning outcomes in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria is rejected.

Discussion of the findings

From the result obtained in Table 1 and 3 shows that, with the adoption of technology-based attendance monitoring improves teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria the attendance rate of teachers has seriously improved because every teacher knows that he or she been monitor by the school administrator. This finding is in disagreement with the findings of Namiti and Ondiek (2020) whose study was on the adoption of The deployment of biometric systems for teacher attendance tracking has been shown to have a transformative impact on teacher performance. A thorough examination of the benefits of biometric systems reveals that their implementation can yield significant dividends for schools, particularly in terms of reducing teacher absenteeism and improving teacher performance.

Similarly, Table 2 and 4 revealed that with the introduction of technology-based attendance monitoring improves teacher attendance rates in government-funded senior secondary schools within the Niger state jurisdiction of the Federal Republic of Nigeria, the teachers always on ground to attend to their students which has gone a long way in progressive academic achievement or academic outcome of the students which in disgreement with the findings of (Akinduyite, Adetunmbi, Olabode, & Ibidunmoye, 2013) which

says whatever method adopted will never make the teachers do what they don't went.

Conclusion

The adoption of technology-based attendance systems has revolutionized the way teacher's attendance is monitored and recorded. By leveraging digital tools and platforms, schools can enhance the accuracy of teachers' attendance.

Recommendation

From the findings of this research, the researcher recommended that. With the implementation technology-based attendance monitoring improves teacher attendance in our school system can create a more efficient, accurate and transparent attendance tracking process; ultimately it will enhance the quality of education and improved the students outcome.

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