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Enhancing Students' Learning Outcomes Using Custom-Built Smart School Management System: A Quasi-Experimental Study in Nigerian Secondary Schools

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Abstract: The integration of digital technologies into school administration and instructional processes has become increasingly important for improving educational outcomes. This study investigates the effect of a custom-built Smart School Management System (SSMS) on students' academic performance in Nigerian secondary schools. The system integrates three key components, namely: social media tools, performance tracking mechanisms, and digital school management functions, designed to enhance student engagement, improve monitoring of academic progress, and streamline administrative processes. A quasi-experimental one-group pretest–posttest design was employed to evaluate the impact of the system. Six secondary schools, comprising three public and three private institutions, were purposively selected for the study. Academic performance data were collected from 438 students before and after the deployment of the SSMS. The collected data were analyzed using a paired sample t-test with the significance level set at $p < 0.05$. The findings reveal a statistically significant improvement in students' academic performance following the implementation of the SSMS. The mean score increased from 59.51 in the pre-implementation phase to 68.45 after the system was deployed, indicating a notable enhancement in learning outcomes. The results suggest that the integration of social media tools for academic interaction, real-time performance monitoring, and automated administrative processes contributed to improved student engagement and academic performance.

Keywords: *Educational Technology, Performance Tracking, Smart School Management System, Secondary Education. Social Media, School Management System.*

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I. INTRODUCTION

The integration of digital technologies into educational systems has become increasingly important, particularly in developing countries where structural and administrative challenges persist. In Nigeria, many secondary schools continue to rely on manual systems for managing academic and administrative activities. Such approaches often limit timely access to information, delay feedback, and reduce the effectiveness of data-driven decision-making.

In response to these challenges, a custom-built Smart School Management System (SSMS) was developed to enhance both administrative efficiency and academic processes. Although the system incorporates several functionalities, this study focuses specifically on three components that are directly linked to learning outcomes. These three components are social media integration, performance tracking, and school management tools.

Earlier work by Agholor (2025) demonstrated that stakeholders which include students, teachers, parents, and administrators have expressed high levels of satisfaction with the SSMS. However, while user acceptance is important, it does not necessarily indicate improved academic performance. This study therefore seeks to evaluate the actual impact of the SSMS on students' learning outcomes by comparing performance before and after its implementation.

➢ *Problem Statement*

Despite increased attention and investment in the education sector, concerns about students' academic performance remain widespread. One of the underlying issues is the continued dependence on manual school management practices, which often result in inefficiencies such as poor record-keeping, delayed feedback, and limited parental involvement. On the other hand, students' engagement with social media has grown significantly. While studies such as Agholor, Agholor, and Aborisade (2020) highlighted the

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negative effects of unregulated social media use, other research studies suggest that these platforms can support learning when used in a structured manner.

This creates a need to explore how a smart school management system, particularly one that integrates social media, performance tracking, and administrative tools can be used to address these challenges and improve students' academic outcomes.

➢ *Objectives of the Study*

The study is guided by the following objectives:

- To examine the effectiveness of the Smart School Management System (SSMS) in improving students' academic performance.
- To analyze the pattern of student enrolment in public and private secondary schools.

➢ *Significance of the Study*

This study is particularly relevant to the Nigerian secondary education system, where several challenges which include large class sizes, limited instructional time, and insufficient monitoring of academic progress continue to affect the quality of education, especially in public schools.

By examining the implementation of a Smart School Management System, this study provides insights that may support the adoption of digital technologies in school administration and learning environments.

First, the SSMS offers a data-driven approach to monitoring students' academic progress. Real-time performance tracking enables teachers to identify learning difficulties early and provide timely academic interventions/remediation.

Second, the system provides teachers with valuable insights into students' learning patterns. By analyzing performance trends, teachers can adjust their instructional strategies and provide more targeted support to students.

Third, the SSMS enhances administrative efficiency by automating tasks such as attendance recording, grading, and report generation. This helps reduce administrative workload while improving transparency and accountability within the school system.

Fourth, the findings of this study contribute to Nigeria's broader digital transformation efforts in education. Initiatives such as the National Digital Economy Policy and Strategy (NDEPS) emphasize the importance of integrating technology into educational systems, and this research demonstrates a practical application of such initiatives.

The study also highlights the importance of parental involvement in students' education. Through the SSMS platform, parents are able to access their children's academic records and receive updates about their progress. This improved communication between schools and families can strengthen student motivation and accountability.

Finally, the system presented in this study offers a scalable framework that other schools may adopt or adapt. As such, the research contributes to broader efforts aimed at improving educational management and promoting technological innovation in Nigeria's education sector.

➢ *Hypothesis*

- *H0:*

There is no statistically significant difference in students' academic performance before and after the implementation of the Smart School Management System.

➢ *Contribution to Knowledge*

This study contributes to the growing body of literature on educational technology in three important ways. First, it provides empirical evidence on the effectiveness of a custom-built smart school management system in improving students' academic performance within the context of Nigerian secondary schools. Second, unlike many previous studies that examine social media or learning management systems in isolation, this research evaluates the combined impact of social media tools, performance tracking mechanisms, and digital school management functions within a single integrated platform. Third, the study offers a practical implementation model that can guide schools and policymakers seeking to adopt technology-driven solutions to improve educational management and student outcomes in developing countries.

II. LITERATURE REVIEW

➢ *System Description*

Smart School Management System is designed to integrate academic, administrative, and communication processes within a unified digital platform. While existing systems such as PowerSchool and EduPage have been widely implemented in developed countries, their adaptation within developing contexts, particularly in Africa, remains relatively limited (Agholor, 2025).

The SSMS developed for this study was designed with flexibility and accessibility in mind, functioning across both web and mobile platforms. It incorporates a range of features aimed at improving teaching, learning, and school administration. Central to this study are three components: social media tools, performance tracking, and school management systems, selected for their potential to directly influence students' learning outcomes.

The social media component was intentionally structured to guide students' interactions toward academic purposes. It facilitates communication among students, teachers, and parents, allowing for the sharing of instructional materials, assignments, and feedback. By embedding these features within the system, the aim is to reduce unregulated usage while promoting meaningful academic engagement.

The performance tracking module enables continuous monitoring of students' academic progress, attendance, and behavioral patterns. Through automated grading and

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analytics, teachers can quickly identify learning gaps and provide targeted support. This aligns with the broader shift toward data-driven decision-making in education.

In addition, the system enhances administrative efficiency by automating routine tasks such as attendance recording, grading, and report generation. This allows educators to devote more time to instructional activities. The inclusion of communication tools also strengthens collaboration between schools and parents, thereby supporting students more effectively.

- *Social Media in Education*

Social media has become an integral part of students' daily lives, influencing how they communicate, interact, and access information. Platforms such as WhatsApp, Facebook, Instagram, TikTok, and YouTube are widely used among secondary school students, particularly in Nigeria. While these platforms are often associated with distraction, their potential for supporting learning has been increasingly recognized.

Tess (2013) notes that social media can facilitate collaborative learning, peer interaction, and real-time communication. Similarly, studies by Suprapto and Rosmala (2011), Özer, Karpinski, and Kirschner (2014), and Raspopovic et al. (2017) demonstrate how these tools can be used to support academic activities such as group work and information sharing.

Research by Manca and Ranieri (2016) and Greenhow and Askari (2017) further highlights the role of social media in promoting engagement and personalized learning. Kara, Cubukcuoglu, and Elci (2020) also emphasize its potential to enhance students' motivation and participation.

However, concerns remain regarding its misuse. Lanclos and Phipps (2019) and Latif et al. (2019) identify issues such as time mismanagement and privacy risks, while Bennett (2017) and Abdelraheem (2013) caution that without proper structure, social media may not contribute meaningfully to academic outcomes. Willems et al. (2018) therefore advocate for balanced approaches that combine institutional regulation with educational use.

Despite the growing body of literature, studies examining the integration of social media within structured systems such as SSMS, particularly in African secondary school contexts, remain limited (Kwaah, 2024). This highlights the relevance of the present study.

- *Performance Tracking*

Traditional assessment methods, which often rely on periodic examinations, have been criticized for their limited ability to provide timely and actionable feedback. In response, digital performance tracking systems have emerged as tools for continuous monitoring of students' progress.

Black and Wiliam (2009) emphasize the importance of formative assessment in improving learning outcomes, while Smith and Jones (2022) highlight the benefits of data-driven monitoring systems. Similarly, Williams and Clark (2020) note that automated feedback mechanisms can support student self-assessment and improvement.

Empirical studies by Ramdas et al. (2019), Zhang, Liu, and Wang (2023), Navarra and Antonio (2025), Khope et al. (2024), and Aljawawdeh (2024) provide evidence that real-time tracking systems can significantly enhance academic performance. These systems enable early identification of learning challenges and support timely intervention.

Attendance monitoring, as noted by White (2025) and Kolosky (2023), also plays a critical role in supporting academic success. Gebhardt (2023) further argues that data-driven insights can facilitate personalized learning and targeted instructional strategies.

- *School Management*

Effective school management is widely recognized as a key factor influencing students' academic performance. Studies by Lugusi, Ambakisye, and Kasumba (2024) and Jacob and Thilagaraj (2022) demonstrate a strong relationship between administrative effectiveness and educational outcomes.

Leithwood, Harris, and Hopkins (2008) argue that leadership plays a critical role in shaping learning environments, while Darling-Hammond, Hyler, and Gardner (2017) emphasize the importance of teacher development. Kraft and Papay (2014) also highlight the role of supportive school environments in improving instructional quality.

Resource allocation (OECD, 2022; UNESCO, 2023), monitoring systems (Ehren, Altrichter, and McNamara, 2013), and parental involvement (Epstein and Sheldon, 2019) are additional factors that contribute to effective school management.

In Nigeria, Nwangwa and Omotere (2013) note that school administrators now perform a wide range of roles, including ICT integration and policy implementation. However, the continued reliance on manual systems limits efficiency, reinforcing the need for digital solutions such as SSMS.

III. METHODOLOGY

This study employed a quasi-experimental research design, specifically a one-group pretest–posttest approach, to examine the effect of the Smart School Management System (SSMS) on students' academic performance. The choice of this design was guided by practical considerations, as all participating schools received the intervention, making the inclusion of a control group unfeasible.

- *Conceptual Framework*

The conceptual framework of this study assumes that the implementation of a Smart School Management System (SSMS) influences students' learning outcomes through three primary components: social media integration, performance tracking, and digital school management functions. These

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components enhance student engagement, improve monitoring of academic progress, and streamline administrative processes, which collectively contribute to improved academic performance. This is illustrated in figure 1.

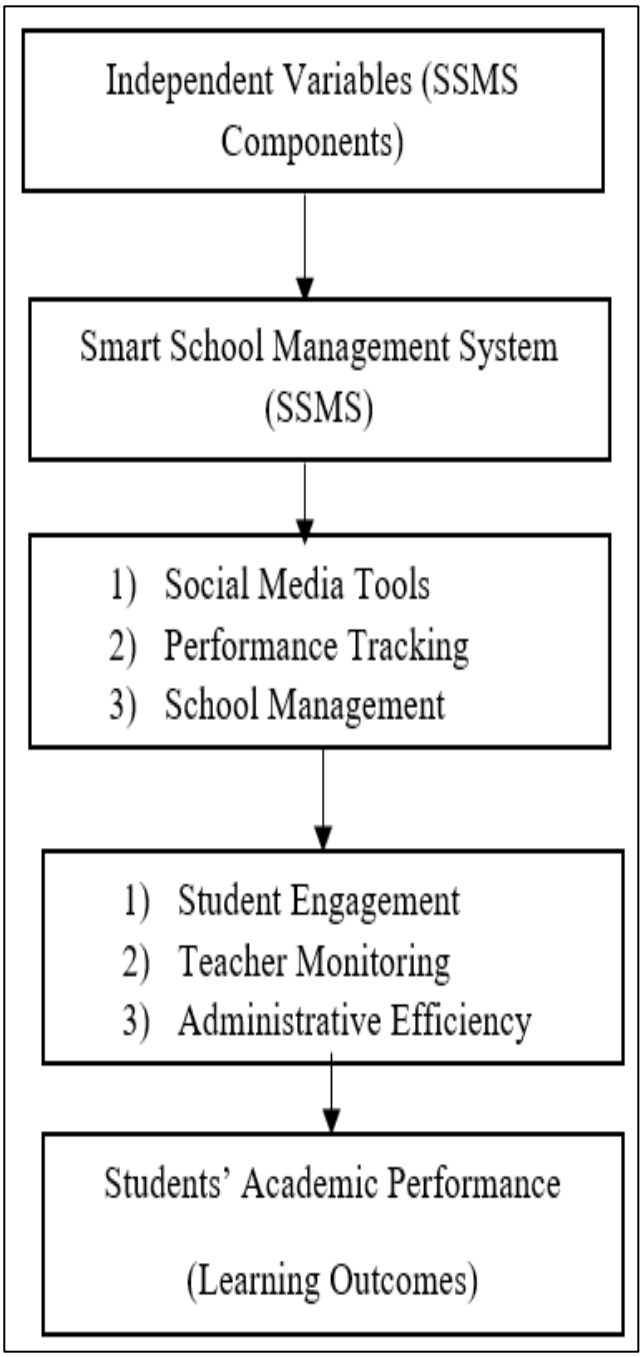

Fig 1 Conceptual Framework

➢ *Research Design*

The pretest–posttest structure allowed for a direct comparison of students' academic performance before and after exposure to the SSMS. By measuring the same group of students at two different points in time, the study was able to capture changes attributable to the intervention, while acknowledging the inherent limitations of non-randomized designs.

➢ *Participants*

The study involved students from six secondary schools, comprising three public and three private institutions. These schools were purposively selected based on their willingness to participate and their capacity to implement the SSMS over a full academic term.

A total of 438 students participated in both the pretest and posttest phases. The sample included students from both science and arts streams, ensuring a balanced representation across different academic orientations.

➢ *Procedure*

The study was conducted in three distinct phases:

- *Phase 1: Pre-Implementation Test (Baseline Assessment)*

At the end of the first academic term, a baseline assessment was conducted across all participating schools. This pretest measured students' academic performance prior to the introduction of the SSMS.

- *Phase 2: System Deployment and Usage*

During the second term, the SSMS was deployed in all six schools. The system incorporated features for social media interaction, performance tracking, and school management. Teachers, students, and administrators received basic training to ensure effective use of the platform. Throughout the term, students' academic activities, including assignments, attendance, and performance were monitored using the system. Some of the screenshot interfaces are shown in figures 2 and 3.

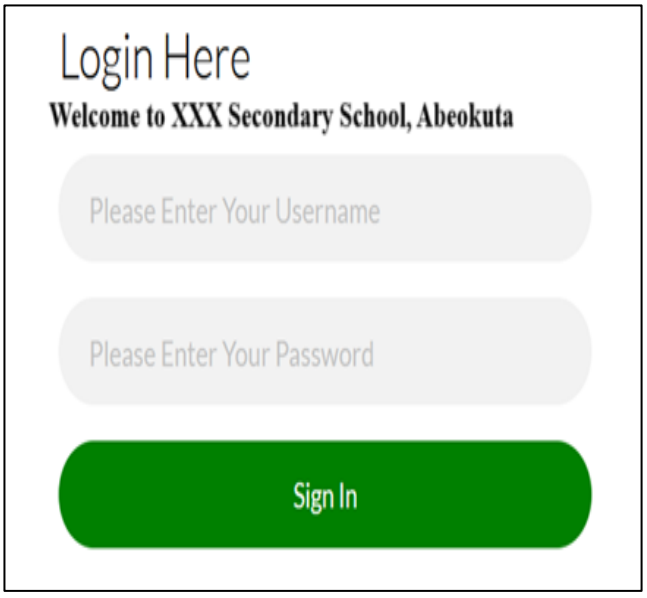

Fig 2 Screenshot of Login Interface

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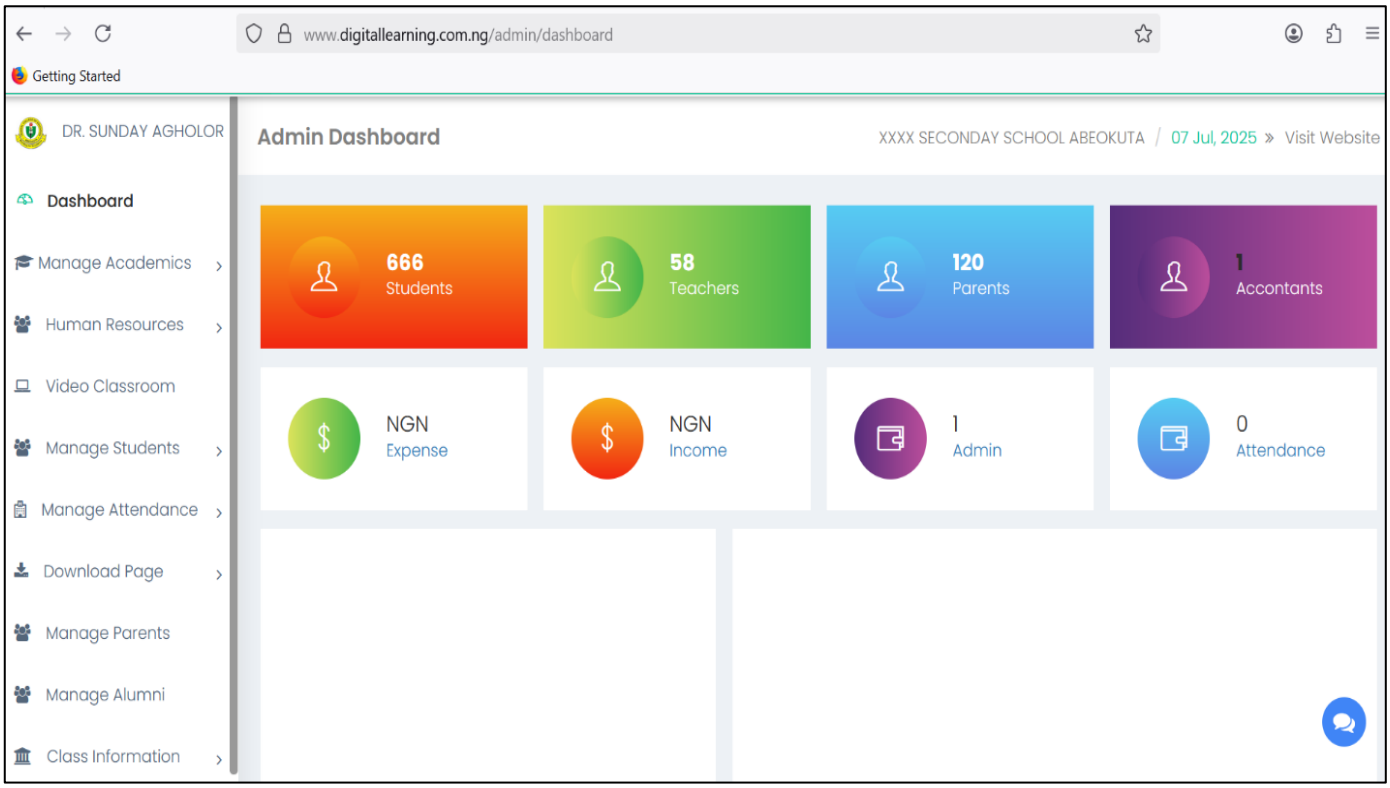

Fig 3 Screenshot of Admin Login

- *Phase 3: Post-Implementation Assessment*

At the end of the second term, students were assessed again using a posttest comparable in structure and difficulty to the pretest. This allowed for a consistent basis of comparison between the two sets of results.

➢ *Data Collection and Analysis*

Academic performance data obtained from the pretest and posttest were compiled and analyzed using IBM SPSS version 23. A paired sample t-test was conducted to determine whether the difference in mean scores before and after the intervention was statistically significant. The level of significance was set at $p < 0.05$.

IV. RESULTS AND DISCUSSION

➢ *Results*

The distribution of students is presented in table 1.

Table 1 Distribution of Students

SCHOOL	STATUS	SSS1A SCIENCE	SSS1B ARTS	TOTAL
A	PRIVATE	27	25	52
B	PRIVATE	25	23	48
C	PRIVATE	22	20	42
D	PUBLIC	48	50	98
E	PUBLIC	47	46	93
F	PUBLIC	51	54	105
TOTAL		220	218	438

A total of 438 students participated in the study, drawn from both public and private secondary schools. The distribution of students indicates that public schools had a higher enrolment compared to private schools, with both science and arts streams well represented. This pattern reflects the broader reality of larger class sizes in public school settings.

The descriptive statistics is presented in table 2.

Table 2 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PRE_SSMS	438	40	89	59.51	12.875
POST_SSMS	438	45	99	68.45	12.719
Valid N (listwise)	438				

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Descriptive statistics show a clear improvement in academic performance following the implementation of the SSMS. The mean score increased from 59.51 before the intervention to 68.45 after its introduction, representing a noticeable gain in overall performance. In addition, improvements were observed in both the minimum and maximum scores, suggesting that the system had a positive effect across different performance levels.

The paired sample t-test is presented in table 3.

Table 3 Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE_SSMS POST_SSMS	-8.938	3.246	.155	-9.243	-8.634	-57.637	437	0.000

To further examine the significance of this improvement, a paired sample t-test was conducted. The results indicate a statistically significant difference between pretest and posttest scores ($p < 0.05$). This finding leads to the rejection of the null hypothesis and confirms that the observed improvement is unlikely to have occurred by chance.

➢ *Discussion*

The results of this study suggest that the implementation of the SSMS had a meaningful impact on students' academic performance. While the statistical evidence confirms the significance of the improvement, it is important to consider the underlying factors that may have contributed to this outcome.

One notable factor is the integration of social media within a structured academic environment. Unlike conventional social media usage, which is often unregulated, the SSMS provided a controlled space where interactions were directed toward learning activities. This aligns with the observations of Tess (2013), as well as Greenhow and Askari (2017), who highlight the potential of social media platforms to support collaborative and interactive learning when properly guided. Similarly, Kara, Cubukcuoglu, and Elci (2020) emphasize the role of such tools in enhancing student engagement and participation.

Another important element is the performance tracking capability of the system. By providing real-time feedback, the SSMS enabled teachers to identify learning gaps at an early stage and respond accordingly. This supports the arguments of Black and Wiliam (2009), who underscore the importance of formative assessment, and Smith and Jones (2022), who demonstrate the effectiveness of data-driven monitoring. The findings are also consistent with more recent studies by Zhang, Liu, and Wang (2023), Navarra and Antonio (2025), and Khope et al. (2024), all of which report improved learning outcomes through the use of tracking systems.

In addition, the administrative features of the SSMS appear to have contributed indirectly to improved performance. By reducing the time spent on routine tasks such as grading and record-keeping, teachers were able to focus more on instructional activities. This observation is consistent with the work of Shahzad et al. (2023), who report that digital management systems enhance institutional efficiency and responsiveness.

The improvement observed across both public and private schools suggests that the benefits of the SSMS are not limited to a particular type of institution. This is particularly relevant in the Nigerian context, where public schools often face challenges related to large class sizes and limited resources. The findings therefore point to the potential scalability of the system across diverse educational settings.

Overall, the results reinforce the view that when digital tools are thoughtfully integrated into school systems, they can do more than streamline administration as they can actively support and enhance student learning.

V. CONCLUSION, RECOMMENDATION AND FUTURE DIRECTION

➢ *Conclusion*

This study provides empirical evidence that a custom-built smart school management system can significantly improve students' academic performance. By focusing on key components such as social media integration, performance tracking, and school management, the study demonstrates how targeted digital interventions can enhance learning outcomes in secondary schools.

The findings highlight the value of integrating technology into educational systems, particularly in contexts where traditional approaches may limit efficiency and responsiveness. Beyond improving performance, the SSMS also promotes transparency, engagement, and better coordination among stakeholders.

➢ *Recommendations*

Based on the findings, the following recommendations are proposed:

- Wider Implementation:

Educational authorities should consider adopting SSMS across more secondary schools to improve academic outcomes.

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- Policy Support:

Government agencies and stakeholders should develop policies that encourage the integration of digital tools in school management.

- Capacity Building:

Teachers and administrators should receive adequate training to ensure effective utilization of the system.

- Ongoing Evaluation:

Continuous monitoring and evaluation should be carried out to assess system effectiveness and identify areas for improvement.

➢ *Future Research Direction*

Future studies could strengthen the evidence base by incorporating control groups and employing longitudinal designs to assess long-term impact. There is also a need to explore other components of the SSMS beyond those examined in this study. Additionally, evaluating system performance indicators such as response time, reliability, and scalability would provide a more comprehensive understanding of its effectiveness.

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REFERENCES

[1]. Abdelraheem, A. Y. (2013). University students' use of social networks sites and their relation with some variables. In proceedings of WEI International Academic Conference Proceedings, Antalya, Turkey, pp. 31–39.

[2]. Agholor, S. (2025). Design and Evaluation of an integrated smart school management system. International Journal of Scientific Research and Modern Technology (IJSRMT), Vol. 4, No. 6. DOI: https://doi.org/10.38124/ijsrmt.v4i6.564

[3]. Agholor, S., Agholor, O. A. and Aborisade, D. O. (2020). A Real-Time Observation Approach for Assessing the Impact of Social Media on Students' Academic Performance. The Journal of Social Media in Society, Vol. 9, No.2, pp. 214-235. Online Journal at www.thejsms.org

[4]. Aljawawdeh, H. (2024). Performance Tracking E-Learning Model: A Case Study. Journal of Statistics Applications & Probability. An International Journal, Vol. 13, No. 1, pp. 199-210. DOI: http://dx.doi.org/10.18576/jsap/130114

[5]. Bennett, L. (2017). Social media, academics' identity work and the good teacher. International Journal for Academic Development, Vol. 22, No. 3, pp. 245–256. DOI: 10.1080/ 1360144X.2017.1305961

[6]. Black, P. and Wiliam, D. (2009). Developing the theory of formative assessment. Educ Asse Eval Acc, Vol. 21, 5–31 DOI: https://doi.org/10.1007/s11092-008-9068-5

[7]. Darling-Hammond, L., Hyler, M. E. and Gardner, M. (2017). Effective Teacher Professional Development. Learning Policy Institute. https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report

[8]. Ehren, M., Altrichter, H., and McNamara, G. (2013). Impact of school inspections on improvement of schools-describing assumptions on causal mechanisms in six European countries. Studies in Educational Assessment Evaluation, Vol. 25, pp. 3–43. DOI 10.1007/s11092-012-9156-4

[9]. Epstein, J. L. and Sheldon, S. B. (2019). The importance of evaluating programs of school, family and community partnerships. Aula Abierta, Vol. 48, No. 1, pp. 31-42.

[10]. Gebhardt, C. (2023). The role of student data monitoring in academic support systems. Educational Systems Journal, Vol. 18, No.1, pp, 34-49.

[11]. Greenhow, C., and Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. Education and Information Technologies, Vol. 22, No. 2, pp. 623–645.

[12]. Jacob, D. K. and Thilagaraj, .A. (2022). Transformational Leadership Theory-A Critical Analysis with reference to Banking Sector. Webology, Vol. 19, No. 2, pp. 152-159.

[13]. Jonas, M. and Mkulu, D. G. (2022). The Role of School Management Team in Managing Students' Academic Performance in Community Secondary Schools in Tabora Municipality- Tanzania. International Journal of Humanities and Education Development (IJHED), Vol. 4, No. 1, pp. 100–116. https://doi.org/10.22161/jhed.4.1.11

[14]. Kara, N., Cubukcuoglub, B. and Elcic, A. (2020). Using social media to support teaching and learning in higher education: an analysis of personal narratives. Research in Learning Technology, 28. https://dx.doi.org/10.25304/rlt.v28.2410

[15]. Khope, V., Bannawade, M. S., Thawali, V. S., Mohod, S. V. and Chopde, N. R. (2024). Enhancing Education: Real-Time Tracking of Students' Learning Outcome and Academic Progress Across Rural Area Schools. International Research Journal of Modernization in Engineering Technology and Science, Vol. 6, No. 4, pp. 1-4. Online journal at www.irjmets.com

[16]. Kolosky, C. (2023). Tracking student progress: Methods and insights. Knack. Retrieved from https://www.knack.com/blog/how-to-track-student-progress/ on 22/03/2025

[17]. Kraft, M. A., and Papay, J. P. (2014). Can Professional Environments in Schools Promote Teacher Development? Explaining Heterogeneity in Returns to Teaching Experience. Educ Eval Policy Anal, Vol. 36, No. 4, pp. 476-500. DOI: 10.3102/0162373713519496

[18]. Kwaah, C. Y. (2024). Social media use among basic school teachers in Ghana: exploring opportunities and challenges, Cogent Education, 11:1, 2310978, DOI: 10.1080/2331186X.2024.2310978

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26mar1133

[19]. Lanclos, D. M. and Phipps, L. (2019). Leadership and social media: challenges and opportunities. Social media in Higher Education: Case Studies, Reflections and Analysis, (Eds) C. Rowell, Cambridge, UK: Open Book Publishers, pp. 141–150. DOI: 10.11647/OBP.0162.13

[20]. Latif, M. Z., Hussain, I., Saeed, R., Qureshi, M. A. and Maqsood, U. (2019). Use of smart phones and social media in medical education: trends, advantages, challenges and barriers. Journal of the Society for Medical Informatics of Bosnia & Herzegovina: casopis Drustva za medicinsku informatiku BiH, Vol. 27, No. 2, pp. 133–138. DOI: 10.5455/aim.2019.27.133-138

[21]. Leithwood, K., Harris, A. and Hopkins, D. (2008). Seven strong claims about successful school leadership. School Leadership and Management, Vol. 28, No. 1, pp. 27-42.

[22]. Lugusi, C., Ambakisye, S. and Kasumba, F. (2024). Contribution of School Management Strategies and Effective Supervision on Students' Academic Performance in Secondary School in Iringa Municipality in Tanzania. Journal of Humanities and Education Development. Vol. 6, No. 5, pp. 102-112,

[23]. Manca, S. and Ranieri, M. (2016a). Facebook and the others. Potentials and obstacles of social media for teaching in higher education. Computers & Education, Vol. 95, pp. 216–230. DOI: 10.1016/j.compedu.2016.01.012

[24]. Navarra, J. M. and Antonio, E. O. (2025). Efficient Student Monitoring and Data Tracking System. Psychology and Education: A Multidisciplinary Journal, Vol. 35, No. 8, pp. 848-867.

[25]. Nwangwa, K. C. K. and Omotere, T. (2013). The new roles of school managers in managing educational challenges in Nigerian schools. European Scientific Journal, Vol. 9, No. 25, pp. 160-170.

[26]. OECD. (2022). Education at a Glance 2022: OECD Indicators. OECD Publishing. https://www.oecd.org/en/publications/2022/10/education-at-a-glance-2022_4aad242c.html

[27]. Özer, I., Karpinski, A. C. and Kirschner, P. A. (2014). A cross-cultural qualitative examination of social-networking sites and academic performance. Procedia – Social and Behavioral Sciences, No. 112, pp. 873–881. DOI: 10.1016/j.sbspro.2014.01.1244

[28]. Ramdas, B. R., Machhindra, M. B., Kailas, W. P. and Raut, M. V. (2019). Tracking and Predicting Student Performance Using Machine Learning. Journal of Emerging Technologies and Innovative Research (JETIR), Vol. 6, No. 2, pp. 439-442. Online journal at www.jetir.org

[29]. Raspopovic, M., Cvetanovic, S., Medan, I. and Ljubojevic, D, (2017). The effects of integrating social learning environment with online learning. International Review of Research in Open and Distributed Learning, Vol. 18, No. 1, pp. 141–160.

[30]. Shahzad, I., Walke, S., Dahat, A. and Kurmi, P. (2023). Smart School Application: Enhancing Administrative Efficiency, Communication, and Personalized Learning in Education. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Vol. 10, No. 2, pp. 524-527. DOI: https://doi.org/10.32628/CSEIT2390267

[31]. Smith, A. and Jones, B. (2022). Enhancing educational outcomes through data-driven monitoring systems. Journal of Educational Technology, Vol. 15, No. 3, pp. 45-60.

[32]. Suprapto, F. and Rosmala, D. (2011). Study of social networking usage in higher education environment. Procedia – Social and Behavioral Sciences, Vol. 67, No. 2012, pp. 156–166. DOI: 10. 1016/j.sbspro.2012.11.316

[33]. Tess, P. A. (2013). The role of social media in higher education classes (real and virtual): a literature review. Computers in Human Behavior, Vol. 29, No. 5, pp. A60–A68. DOI: 10.1016/j.chb.2012.12.032

[34]. UNESCO. (2023). Global Education Monitoring Report 2023: Technology in Education – A Tool on Whose Terms? UNESCO. https://www.unesco.org/gem-report/en/publication/technology-education

[35]. White, L. (2025). Strategies to improve student attendance and academics. SchoolStatus. Retrieved from https://www.schoolstatus.com/blog/data-driven-education-strategies on 22/03/2025

[36]. Willems, J. A., Adachi, C., Bussey, F. Doherty, I. and Huijser, H. (2018). Debating the use of social media in higher education in Australasia: where are we now? Australasian Journal of Educational Technology, Vol. 34, No. 5, pp. 135–149. DOI: 10.14742/ajet.3843

[37]. Williams, R. and Clark, T. (2020). Enhancing user trust through security and privacy in educational data systems. Journal of Educational Technology, 19(2), 40-55.

[38]. Zhang, Y., Liu, S. and Wang, X. (2023). The role of real-time data tracking in educational management systems. Journal of Educational Technology Systems, Vol. 52, Mo. 2, pp. 213-229.