Strategies for Managing Public Schools in A Digital Age

Sarah Sachar

Faculty of Education Kampala International University Uganda

Email: sarah.achar@studmc.kiu.ac.ug

ABSTRACT

The rapid advancement of technology has transformed the landscape of public education, presenting both opportunities and challenges for educators, administrators, and stakeholders. This paper examines strategies for managing public schools in a digital age, focusing on the integration of digital tools for teaching, administration, cybersecurity, and community engagement. Key areas discussed include the evolution of educational technology, the implementation of Student Information Systems (SIS), cybersecurity measures, professional development for educators, and approaches to engaging parents and communities in digital education. By adopting strategic planning and robust training programs, schools can harness the potential of digital tools to foster equity, efficiency, and innovation in education. Furthermore, this paper emphasizes the importance of collaboration among stakeholders to ensure that technology integration meets the diverse needs of students and prepares them for a digitally driven future.

Keywords: Digital education, Educational technology, Public school administration, Student Information Systems (SIS), Cybersecurity in education, Professional development.

INTRODUCTION

Education's modern age is digital. New technologies are present in every activity of educational communities, offering opportunities and challenges, advantages and disadvantages. Educators should be prepared to incorporate these tools and environments into teaching and learning and to know when it is pertinent to use them. One of the main objectives in choosing digital tools and platforms for education is to prepare our students for the future. Communicators compete powerlessly for the attention and trust of audiences. So powerful, in fact, is the role of digital in how students search, trust, and perceive that institutions once again are forced to adjust. This digitally literate student puts digital investments in new hands. In competitions, the winners are those who can indeed predict the future of the digital world, which is completely impossible [1, 2]. Many stakeholders, including parents and their families, trustees, governance committees, investors, advisory bodies, and community members, were found to be at the mercy of rapidly changing digital tools. A study on student study habits found that digital resources do have a major impact on students' study strategy, focus, and study habits. It is no longer feasible for an institution to contemplate change with a higher degree of tolerance to current digital and physical resources. It is important to research that digital tools meet the needs for which those tools are used or that they can provide useful information to make changes along the technological horizon for using technological alternatives. This suggests a need for strategic planning when choosing methods, digital resources, and practices. In educating another individual, the minimum investment will also be of substantial value to future generations [3, 4].

Evolution of Technology in Education

Educational technology has evolved in a series of large steps in the last century. Since computer-assisted language learning was first mentioned in 1960, educational technologists have developed hardware such as computers, projectors, and interactive whiteboards, and software such as computer-assisted language learning, and web 2.0 tools such as blogs, wikis, podcasts, and social network tools. Policy documents have also evolved from discussing primarily grammar skills in the 1960s to include language skills integration (listening, speaking, reading, and writing) in the 2000s. This text will present a brief history of educational technology and discuss some of the successes and barriers involving the integration of computer technology into the English language classroom [5, 6]. Educational technology historically followed a step-by-step trajectory of progress that eventually surpassed the use of the overhead projector, hired tutors, and computer programs and arrived at the interactive whiteboard. Evaluations of the effectiveness of whiteboard use showed that students in mathematics classes attended by teacher trainers improved mostly due to the reduction in the time between beginning a problem and solving it. Teachers posed problems on the whiteboard and intervened in the students' construction of math knowledge by visiting small groups of students who were collaborating on a solution [7, 8].

Digital Tools for School Administration

Although school administration is often criticized as ineffective and wasteful, it often has no time to manage the torrent of paperwork accumulating on their desks. The problem may not be a waste of time and money, but a misapplication of it. A new wave of projects is creating a wide range of online social opportunities by facilitating efficient online socializations. In this paper, we review the kinds of digital tools available to reduce the burden of much administration of schools, enhance communication between principals, teachers, other staff, parents, and others, improve internal record-keeping, report writing and archiving, and add flexibility to otherwise hard-to-do tasks. The new tools are sometimes integrated systems, or, increasingly, specialized systems focusing on particular administration functions like pupil attendance or financial management [9, 10]. The administration of an organization involves major tasks like planning, organizing, communicating, delegating, leading, and decision-making—and especially during the current age, managing information. The administration of an educational institution can be conceived of as the process through which resources of people, procedures, and technology coalesce to achieve systemic goals. It is about the implementation of abstractions like leadership or management for explicitly stated purposes. The 21st-century school is revealed to be a fascinatingly holistic, complex, and vibrant organization. However, it is often not up to date in terms of digital tools for organizational administration. If educational leadership is about helping other people to grow and develop in a complex organization, it can be expected that such people will be grateful if their community starts to deploy functions, or intervention programs, that save them time and also help to solve the underlying issue. It should be noted that it is often not possible to start with a complex package; instead, rather, commence with the low-hanging fruit and easy win package [11, 12].

Student Information Systems

Student Information Systems (SIS) have become widely accepted as an essential part of the administrative tools needed to manage modern-day public schools. SIS are cloud-based, centralized systems that store pertinent student information from students' bio-data to charters, schedules, contact information, and academic, and behavioral data in one location. The information can be accessed by each employee or stakeholder within a school district and, in some cases, can be shared across multiple software systems that are integrated into the SIS. SIS can serve the registrar, enrollment manager, counselor, teachers, students, and parents. SIS is meant to save time through automated processes, enhance security by keeping all data in one location, and inform practices by offering data reporting systems internal and external to the school district they serve. SIS includes an array of functions that can serve school administrators, teachers, and support staff, including school office personnel. These include but are not limited to demographics, scheduling, and student assignment to a classroom, assessment scores, attendance, grade book, transcribing, a student portal, district and school setting, data repository for longitudinal growth and insights, communication tools for parents, and a digital repository increasing data-informed decision-making and reducing paper usage. Implementing SIS in a district can provide opportunities for principals to develop master schedules that close educational gaps over time and in real time. Approaches such as designing grade-level buffers, balancing numbers and student profile qualities, ensuring equitable student-to-teacher ratios, and even integrating a fully operational system of pages per teacher to target interventionists can occur instantly over time with an integrated SIS. Once used, SIS

offers time and information-free service support over time. Implementing SIS can result in more timely interventions to offer students, reduce most reporting compliance times, exponentially increase behavioral trend recognition, and enhance the contact time with teachers when interventions are prioritized over paper shuffling. Administrators need real-time reports and data used to inform competitive and proactive decisions to close opportunity gaps over time. Students need a digital support system that grows with them and stretches across time in a centralized and reliable fashion. New student enrollment, intra-district transfer, location eminent domain, IEP processing, homeless traveling youth, staffing analysis, program management, academic analytics, and leader daily dashboards for predictions and responses can all be improved with a robust SIS. SIS improves time management, reduces multiple entries, and makes accessible student data for decision-making regularly. SIS can be a difficult implementation, can be costly, and must be embraced by a high number of a district's operational digital framework. Districts' systems of digital intervention must be capable of being supported by their adopted SIS [13, 14].

Cybersecurity Measures for Educational Institutions

Life during a global pandemic has taught everyone that working in a digital environment can present a wide range of challenges, and with it, the necessity of practicing good cybersecurity measures. Educational institutions are in no way different regarding the need for good cybersecurity, and in fact, they are one of the most attractive and vulnerable targets. Cyberattacks on educational institutions are becoming common and can have devastating implications. An essential tech skill for all educational leaders is knowing how to safeguard the data and privacy of students and staff who utilize educational technology. Data breaches usually occur when a system is hacked or exploited from within. They can have damaging effects for everyone involved, especially for students when the compromise involves their data privacy. [15, 16]. Cybersecurity is a team effort, and everyone in educational institutions should be involved. Therefore, a sound place to begin incorporating strong cybersecurity measures is to educate all individuals who use the educational system daily: staff, students, administrators, board members, parents, community members, volunteers, and visitors. Staff and students need to be trained and given information related to cybersecurity best practices, from creating a strong password that cannot easily be figured out to knowing how to detect an email phishing attack. This also aligns with the federal law regarding the use of a comprehensive program for information security policy. Strategies for keeping the system safe and protected include evaluation and updates regarding physical and technical security, as well as security awareness training for the entire community. These strategies incorporate unique approaches while including best practices. Creating a customized strategy will allow individual districts to remain safe and keep the system protected. Balancing classroom innovation with the safety and security of educational digital technology is a challenge for administrators today [17, 18].

Data Protection and Privacy Regulations

Educational institutions are required to adhere to several data protection and privacy regulations. Schools must protect the personally identifiable information contained in student records. There are regulations aimed at websites seeking to collect information from children under 13 years of age. Educational institutions receiving funds from the federal government are considered to be one of the entities that collect information via websites and online services. Non-compliance with these regulations carries serious implications. To date, large fines have been levied on K-12 schools, colleges, and universities for careless data protection practices. Additionally, data breaches may also expose school districts to data protection litigation. Schools have a responsibility to be aware of digital tools in use in classrooms, the potential implications of data protection, and if needed, obtain student, parent, and/or guardian consent [19, 20]. Best practice educators and technology directors are recommended to develop or improve digital literacy programs, including electronic citizenship and digital etiquette for students. Because data privacy and digital literacy are fast-moving targets, electronic citizenship, and digital etiquette programs should be ongoing and constantly updated. Becoming familiar with the basic principles of data protection and the data an educational institution creates, maintains, and can share is the first step to understanding the legal obligations of the school and the possible risks of the data. Sending the requirements to technology staff reiterates the importance of obtaining consent from students and/or parents/guardians. Developing or improving a policy to inform parents and the community about what data is made public on each student, ranging from academic records, student organization memberships, academic recognition lists, birthday announcements, and participation in school events, sports, plays, and elective activities [21, 22].

Professional Development for Educators in a Digital Environment

Ongoing professional development for educators remains essential to successfully manage the management of public schools as they navigate the digital age. Teachers and school leaders have identified ongoing, meaningful professional development as one important area of support to assist in integrating digital tools into their classroom environments. In addition to learning about various digital tools, teachers and administrators also need to learn about innovative pedagogy through which learners can use digital tools to critically engage with content. More than ever, educators who want to reach students today need to be well-versed not only in those digital tools but also in innovative methods of teaching that can make good use of those tools. We outline various types of professional development programs that are inspired by the principles promoted in the digital badges project, including intensive summer professional development and yearlong support. However, it is vital to note that the types of professional development teachers need most commonly point to the collaborative dimension of educators actively learning from each other in a professional learning community. The importance of professional development opportunities and resources that provide teachers with these opportunities is an important strategy in developing the technology skills and dispositions necessary for them to be effective classroom practitioners [23, 24]. A report explained that many teachers do not feel they have had education in time management strategies. While there are myriad resources available for meaningful professional development activities that support teachers in gaining appropriate technology integration skills, the mere provision of a variety of professional development opportunities does not guarantee success. Of equal importance are the logistics of offering professional development opportunities as they relate to time constraints, resources, and viability. To truly support teachers in advancing their pedagogical and technology skills, a variety of methods must be made available that address differing levels of experience and access to technology as they relate to specific educational contexts. To develop much-needed programs based on the principles underpinning digital badges, evaluation of standards and guidelines must be assessed, including 21st-century skills and professional development standards. These programs should include professional development workshops led by experts in technology-enhanced language instruction. You can gauge teacher learning in these areas and supplement technology and pedagogy training through personal coaching of 21st-century skills delivered by successful instructors. The use of digital badges in the design of professional development programs for educators in charge of public schools has the potential to offer ongoing activation, interaction, and engagement to all members of the professional learning community. In this section, we envision the potential partnerships with technology companies who might wish to sponsor and contribute to the development of the technology-enhanced language teachers' digital badge and, subsequently, the full system for introducing and validating teacher badges. These partnerships would infuse critical funding to support innovations and program presentations, allowing more targeted professional development workshops and full course launches. Our sponsors would provide practical application of essential principles they would like teachers to learn. Indeed, the implementation of professional development badges is all about developing strong, practical, and workable programs [25, 26].

Training on Digital Tools and Platforms

The human infrastructure needed to teach effectively in these changing times includes knowledge of and the ability to integrate teaching strategies through open and digital teaching platforms. Although not exhaustive, the following list provides examples of the types of digital tools that are being researched and presented at educational academic conferences. Examples of these types of digital tools are learning management systems (both open and private), Web 2.0 tools, virtual worlds, digital game-based learning, simulations, and social networking. What personalized training is necessary to teach teachers to trust them and embed digital tools in their classrooms? [27, 28]. Showing teachers how to use digital tools and how to integrate lessons is essential for the incipient trust needed for new ideas to grow. Hands-on use was indeed the best predictor of achieving ICT integration at a high level. Teachers who had 1 to 6 hours of staff development on technology tools indicated they used the hardware and software integration strategies to a much lesser degree than the teachers who received 7 hours or more of staff development. Cultivating trust by integrating digital tools into lessons requires training for teachers. Professional development solutions for women in high school typing on the keyboard are more effective than men's training. Some possible training solutions include providing training during conferences in the form of model school workshops or in-service professional development workshops where practicing classroom teachers are brought into the training as part of the participant pool. Online college and university

courses taught to teachers are a good model for learning how to use many digital tools, but teachers need face-to-face time to plan what to teach, how to teach, and how to interact. Leaders must attend workshops to hear the discussions of various digital tools and platforms to make good financial decisions and lead with confidence [29, 30].

Engaging Parents and The Community in Digital Education

When schools are engaging parents and the broader community in digital education, they rely heavily on clear and efficient communication. Parents need to understand how technology is being integrated into teacher practices and how it is affecting their students. They need regular reports on how well their students are learning in the digital age. This includes not only assessments and other student progress data but also the evolving nature of digital education itself. Surveys show that parents are more actively involved in their children's work—and more supportive of digital learning—when they are informed. For the same reason, some surveys find that they are less likely to pull their children out of computer-based learning during the school day. Edtech can help students and parents stay up to date on school activities and homework, whether it is a calendar of events, a homework hotline, or an online gradebook. Several services will send automatic texts or emails if a student misses an assignment or begins to struggle in class [25, 26]. However, some schools find that parents are more likely to take advantage of both ed tech and, more broadly, get involved in school programs when they are asked to partner, not just communicate. When teachers arrange ways for parents to follow along and participate in class projects that involve technology, students tend to improve their tech proficiency. Almost as importantly, parents become more capable of offering meaningful help. Research shows that reading and math improve when parents get tutoring in those subjects—or any subjects, for that matter. Some schools have designed specific programs or centers for that purpose. Before assuming that parents are uniformly eager to get involved, remember that not all families have equal digital access and literacy. In many places, especially those with low-income parents, schools hold training sessions or provide resources on digital education issues. Some districts set up sessions to coach parents in digital communication and rights in an increasingly connected society. How well a school facilitates dialogue between students and their parents appears to depend largely on how teachers and administrators lay out the use of the technology. Schools need to set expectations and educate parents about the use of such tools. Data showed that only a portion of educators surveyed said that their schools provided training for parents on the use of the system. Printed reports detailing student computer proficiency likewise seem to only show up in half of the schools, according to a separate survey of districts [30, 28].

CONCLUSION

Managing public schools in the digital age requires a multifaceted approach that balances innovation with inclusivity, efficiency, and security. The integration of digital tools such as Student Information Systems enhances administrative efficiency, supports data-driven decision-making, and enables real-time interventions to address educational gaps. Simultaneously, robust cybersecurity measures are critical to protecting sensitive data and ensuring compliance with privacy regulations. Professional development initiatives are essential to equipping educators with the skills needed to integrate digital tools effectively, while collaborative efforts with parents and the community foster a supportive ecosystem for student success. By adopting strategic, well-planned methods and investing in continuous training and engagement, public schools can navigate the complexities of the digital era and position themselves as leaders in innovative and equitable education practices.

REFERENCES

1. Burbules NC, Fan G, Repp P. Five trends of education and technology in a sustainable future. Geography and sustainability. 2020 Jun 1;1(2):93-7.
2. Nuere S, De Miguel L. The digital/technological connection with COVID-19: An unprecedented challenge in university teaching. Technology, Knowledge and learning. 2021 Dec;26(4):931-43.
3. Mirza Q, Pathan H, Khatoon S, Hassan A. Digital age and reading habits: Empirical evidence from Pakistani Engineering University. TESOL International Journal. 2021;16(1):210-31.2.
4. Limniou M, Varga-Atkins T, Hands C, Elshamaa M. Learning, student digital capabilities and academic performance over the COVID-19 pandemic. Education Sciences. 2021 Jul 20;11(7):361.
5. Carstens KJ, Mallon JM, Bataineh M, Al-Bataineh A. Effects of Technology on Student Learning. Turkish Online Journal of Educational Technology-TOJET. 2021 Jan;20(1):105-13. ed.gov

6.   González-Salamanca JC, Agudelo OL, Salinas J. Key competences, education for sustainable development and strategies for the development of 21st century skills. A systematic literature review. Sustainability. 2020 Dec 11;12(24):10366.

7.   Erdener K. Students' Attitudes towards Using Interactive Whiteboard in Mathematics Classrooms. International Journal of Technology in Teaching and Learning. 2021;17(2):84-94. ed.gov

8.   Wei X, Cheng IL, Chen NS, Yang X, Liu Y, Dong Y, Zhai X, Kinshuk. Effect of the flipped classroom on the mathematics performance of middle school students. Educational Technology Research and Development. 2020 Jun;68:1461-84. [HTML]

9.   Al Rawashdeh AZ, Mohammed EY, Al Arab AR, Alara M, Al-Rawashdeh B. Advantages and disadvantages of using e-learning in university education: Analyzing students' perspectives. Electronic Journal of E-learning. 2021 May 17;19(3):107-17. academic-publishing.org

10. Boehlje M, Langemeier M. Information Technology and Value Creation. farmdoc daily. 2021 Mar 12;11(37).

11. Butola LK. E-learning-a new trend of learning in 21st century during COVID-19 pandemic. Indian Journal of Forensic Medicine & Toxicology. 2021;15(1):422-6.

12. Szabó CM, Bartal O, Nagy B. The methods and it-tools used in higher education assessed in the characteristics and attitude of gen z. Acta polytechnica hungarica. 2021;18(1):121-40. uniduna.hu

13. Mohammadi MK, Mohibbi AA, Hedayati MH. Investigating the challenges and factors influencing the use of the learning management system during the Covid-19 pandemic in Afghanistan. Education and Information Technologies. 2021 Sep;26:5165-98. springer.com

14. Alam A. Cloud-based e-learning: development of conceptual model for adaptive e-learning ecosystem based on cloud computing infrastructure. InInternational Conference on Artificial Intelligence and Data Science 2021 Dec 17 (pp. 377-391). Cham: Springer Nature Switzerland. [HTML]

15. Dolliver DS, Ghazi-Tehrani AK, Poorman KT. Building a robust cyberthreat profile for institutions of higher education: An empirical analysis of external cyberattacks against a large university's computer network. International Journal of Law, Crime and Justice. 2021 Sep 1;66:100484. [HTML]

16. Eshetu AY, Mohammed EA, Salau AO. Cybersecurity vulnerabilities and solutions in Ethiopian university websites. Journal of Big Data. 2024 Aug 23;11(1):118.

17. Fisk N, Kelly NM, Liebrock L. Cybersecurity communities of practice: strategies for creating gateways to participation. Computers & Security. 2023 Sep 1;132:103188.

18. Cheng EC, Wang T. Institutional strategies for cybersecurity in higher education institutions. Information. 2022 Apr 12;13(4):192.

19. Yu R, Lee H, Kizilcec RF. Should college dropout prediction models include protected attributes?. InProceedings of the eighth ACM conference on learning@ scale 2021 Jun 8 (pp. 91-100). acm.org

20. Fedorova EP, Skobleva EI. Application of blockchain technology in higher education. European Journal of Contemporary Education. 2020;9(3):552-71.

21. Dashtestani R, Hojatpanah S. Digital literacy of EFL students in a junior high school in Iran: voices of teachers, students and Ministry Directors. Computer Assisted Language Learning. 2022 May 4;35(4):635-65. [HTML]

22. Pratolo BW, Solikhati HA. Investigating teachers' attitude toward digital literacy in EFL classroom. Journal of Education and Learning (EduLearn). 2021;15(1):97-103. intelektual.org

23. Sanusi IT, Oyelere SS, Omidiora JO. Exploring teachers' preconceptions of teaching machine learning in high school: A preliminary insight from Africa. Computers and Education Open. 2022 Dec 1;3:100072.

24. Bragg LA, Walsh C, Heyeres M. Successful design and delivery of online professional development for teachers: A systematic review of the literature. Computers & Education. 2021 Jun 1;166:104158.

25. De Villa JA, Manalo FK. Secondary teachers' preparation, challenges, and coping mechanism in the pre-implementation of distance learning in the new normal. IOER International Multidisciplinary Research Journal. 2020 Sep;2(3):144-54. ssrn.com

26. Pérez-Sanagustín M, Sapunar-Opazo D, Pérez-Álvarez R, Hilliger I, Bey A, Maldonado-Mahauad J, Baier J. A MOOC-based flipped experience: Scaffolding SRL strategies improves learners' time management and engagement. Computer Applications in Engineering Education. 2021 Jul;29(4):750-68. [HTML]

27. Timotheou S, Miliou O, Dimitriadis Y, Sobrino SV, Giannoutsou N, Cachia R, Monés AM, Ioannou A. Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. Education and information technologies. 2023 Jun;28(6):6695-726. springer.com

28. Hassan MM, Mirza T, Hussain MW. A critical review by teachers on the online teaching-learning during the COVID-19. International Journal of Education and Management Engineering. 2020 Oct 1;10(5):17. researchgate.net

29. Gupta C, Gupta V, Stachowiak A. Adoption of ICT-Based Teaching in engineering: An extended technology acceptance model perspective. IEEE Access. 2021 Apr 13;9:58652-66.

30. Mlambo S, Rambe P, Schlebusch L. Effects of Gauteng province's educators' ICT self-efficacy on their pedagogical use of ICTS in classrooms. Heliyon. 2020 Apr 1;6(4).20.