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Effective Strategies K–12 School Leaders Can Use to Improve Technology Integration in Classrooms

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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2025

Abstract

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MS, McGill University, 2020

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Research Project Submitted in Partial Fulfillment

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Doctor of Business Administration

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Abstract

With the rapid rise in demand for effective technology integration in K-12 classrooms, particularly in nonpublic schools, strong leadership is crucial. The absence of effective strategies can hinder student learning outcomes, posing a significant challenge for educators who are striving to improve academic success. This qualitative research project included a pragmatic inquiry design was to explore the strategies that some K–12 school leaders apply to improve classroom technology integration and enhance student learning outcomes. Grounded in the technology integration matrix framework, the study involved a purposive sample of five school leaders from nonpublic K-12 institutions in Maryland. Data were collected through semistructured interviews and analyzed using thematic analysis. Key findings revealed eight themes, including the importance of differentiated professional development, building teacher buy-in, ensuring digital equity, and selecting appropriate tools through inclusive decision making. The project also highlighted the pivotal role of leadership in modeling and sustaining innovation. A key recommendation is for educational leaders to invest in systems that provide continuous support for teachers while creating a culture that encourages responsible, student-centered technology use. The implications for positive social change include the potential to expand equitable access to digital learning tools in nonpublic schools, which may help educators create more inclusive and effective learning environments for all students.

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Dedication

رَّبِّ زِدْنِي عِلْمًا

“And say, ‘My Lord, increase me in knowledge.’”

— Surah Taha (20:114)

The Prophet ﷺ said: “Whoever travels a path in search of knowledge, Allah will make easy for him a path to Paradise.”

— Sahih Muslim

In the name of Allah, the Most Gracious, the Most Merciful.

Alhamdulillah — all praise and thanks are for Allah ﷻ, the source of all strength, wisdom, and patience. Every step of this journey, every page of this work, is a testament to His mercy and guidance. I am endlessly grateful for the opportunity to seek knowledge and to serve through it.

This work is lovingly dedicated to:

My beloved parents — your duas, sacrifices, and unconditional love laid the foundation for everything I’ve achieved. This is your success as much as it is mine.

My dear husband, **Ahmed** — the one who first encouraged me to begin this journey. Your faith in me, your sacrifices, and your quiet strength carried me through. I will always be grateful for your love and support.

My amazing daughters, **Ramlah and Zaynab** — you are my heart. Your understanding, patience, and encouragement gave me the motivation and joy I needed during the hardest times. Ramlah and Zaynab, your companionship on this journey means more than words can express.

My dear sister, mentor, and best friend, **Aisha Elahi** (May Allah have mercy on her) — your unwavering support, sincere advice, and heartfelt companionship continue to light my path. You are deeply missed, and I pray this work brings you reward.

And to everyone who made du'a for me, checked in on me, offered a kind word, or reminded me to keep going — your support, even in the smallest ways, meant everything. You helped carry me when I could not move forward on my own.

May Allah accept this effort, forgive my shortcomings, and make it a source of benefit in both this life and the next. Ameen.

Acknowledgments

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To Dr. Elizabeth Musil, thank you for your valuable insights and encouragement that helped refine my work and push it to a higher standard. Your perspective was always appreciated, and your feedback helped me stay focused and clear in my writing.

A very special thank you goes to my editor and eldest daughter, Ramlah Amsa. You've been by my side every step of the way—reviewing drafts, fixing my words, and encouraging me even when I didn't think I had anything left to give. You didn't just edit this paper—you carried me through the entire journey. I'm so proud of you and beyond grateful for your love and support.

To everyone who made du'a for me, listened to me vent, or reminded me of my "why"—thank you. This milestone isn't mine alone; it belongs to all of you, too.

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Section 1: Foundation of the Project

Background of the Problem

People are rapidly transitioning into an increasingly integrated society, where technology will play a pivotal role in their daily lives. With leading-edge solutions, organizations look for ways to improve performance and revenue for long-term growth. Having become an influential factor (Yaraş & Öztürk, 2022), technology helps organizations to have market growth and competitive advantage in the world of business (Park et al., 2021).

Most age groups are regularly connected to technology or digital tools, starting with education in childhood (McNaughton et al., 2022). As technology use increases in K–12 schools, school leaders must find solutions to enhance the pedagogy used in the classrooms for instructional services (Liao et al., 2021). Technology has formed a foundation in various methods to provide the best options for educational paths and learning styles (L. Wu et al., 2023). School leadership teams find ways to incorporate technology to positively enhance classroom learning strategies (Christopher et al., 2023). Implementing technology in K–12 schools can pose a problem for school leaders to continue with technological tools without finding solutions.

Business Problem Focus and Project Purpose

Technology is a critical component in the educational industry. K–12 schools face challenges in the positive integration of technology that helps achieve better academic performance (Bogdandy et al., 2020). Without precise implementation and support strategies, schools struggle to maximize the benefits of technology, leading to

underutilized resources and limited academic growth (Pata et al., 2022). The specific business problem was that some K–12 school leaders struggle to identify, implement, and sustain effective strategies that ensure teachers adopt and integrate technology in their instructional services, which stems from classroom instructions missing the utilization of the technological solutions invested, limiting students from attaining a positive outcome. The current qualitative project explored effective strategies that K–12 school leaders can use to improve technology integration in the classroom. Technology can involve challenges such as training, culture change, and new classroom system implementations (Rath et al., 2021). By exploring the experiences and practices of school leaders who had successfully implemented technology, the current project aimed to identify best practices, challenges, and recommendations to help schools enhance instructional effectiveness and student engagement through technology.

Research Question

What strategies can K–12 school leaders apply to improve technology integration in the classroom to enhance student learning outcomes?

Assumptions and Limitations

The current project involved assumptions and limitations that highlighted the necessity of conducting the project to identify innovative solutions for achieving positive outcomes. Assumptions and limitations shape the research topic, ensuring an objective approach while enhancing reliability and validity (Saunders et al., 2019). Taking into account the following assumptions and limitations, I avoided personal bias.

Assumptions

Assumptions must be identified in a study to guide the investigation. Assumptions are elements considered true despite a lack of verification, forming the foundation for the study (Saunders et al., 2019). Assumptions include expectations about the availability of resources, participant response accuracy, and implemented systems' effectiveness. I assumed that schools provided adequate technology, infrastructure, and training to facilitate digital learning. Participants were assumed to provide honest insights about their experiences without personal bias affecting their responses. Another assumption was that students are engaged in learning because their motivation is often linked to academic success. While these assumptions help shape the research framework, they also introduce potential risks if they do not accurately reflect reality.

Limitations

Every study includes limitations that can impact findings. One of the primary challenges in integrating new technologies into schools is the possibility of inadequate information technology (IT) infrastructure, which may hinder effective implementation (Zengin, 2023). Additionally, a lack of clear policies and procedures can create inconsistencies in the adoption of technology across different institutions (Göçen et al., 2020). Limited funding is another obstacle because schools with insufficient financial resources may struggle to acquire or maintain necessary tools. Furthermore, teachers and staff require ongoing training and support to use new technologies effectively; without the training and support, implementation may not be as successful as anticipated (Deroncele-Acosta et al., 2023; Pata et al., 2022). These constraints were acknowledged

to provide a realistic understanding of the current project's scope and to inform future improvements in educational technology adoption.

Transition

The growth of technology affects people's daily living, including the educational system. K–12 school leaders face challenges in implementing and continuing technology integration among their teachers (Bogdandy et al., 2020). School leaders must identify areas that can support their teachers and provide appropriate resources that accommodate technological advancements within the instructional services (Pata et al., 2022). The current project assumed that K–12 school systems have adequate resources to integrate technology, school leaders do not bear any biases about using technology for education, schools have provided the appropriate tools and training, and students feel motivated and engaged. Limitations such as IT infrastructure, policies, funding, and adequate training and support for staff bring various challenges to the school system when implementing effective use of technology. Section 2 contains an extensive literature review of previous studies that informed the current project's focus to exploring how school systems have gone through technology integration.

Section 2: The Literature Review

A Review of the Professional and Academic Literature

Technology, a rapidly expanding force in industry and business, is becoming crucial in the educational setting (van Meeteren et al., 2022). The current project explored technology integration in K–12 education, seeking strategies to improve technology use among teachers. Each age group sees an increase in the use of the internet, social media, and other technological platforms (Yaraş & Öztürk, 2022), leading people to use technology in the workplace, higher education, and day-to-day activities. Technological transformation in the educational system is a meaningful solution that will positively impact the educational world (Wu & Jiang, 2022). As technology continues to grow, comprehending its integration in the classroom is crucial for students and teachers to succeed in the digital world.

The research question in the current project addressed the strategies that K–12 school leaders, in collaboration with teachers, need to implement technology successfully. This literature review included journal articles and conference papers to identify strategies used in K–12 schools to implement technology in the classrooms. The Walden University Library and Google Scholar were used to search for previous studies. The databases searched included ABI/INFORM Collection, Computer Science, EBSCOhost, Emerald, ProQuest, and Science Direct. Most studies were published within the last five years to identify recent changes in the world of technology. Table 1 outlines the information on the literature reviewed for this project with details on the (a) total

number of sources, (b) peer-reviewed sources, and (c) sources published within the last 5 years.

Table 1

Summary of the Literature Review

Source	Number	Percentage
Complete literature	350	100%
Peer-reviewed literature (2019–2024)	326	93%
Literature published within 5 years	330	94%

Academics are a part of life, and technology is a component in the implementation of the learning process that has an evolutionary role in many aspects of human lives, making people look forward to a better and brighter future (Zengin, 2023). The following keywords were used to find articles on technological transformation within the K–12 classroom: (a) *digital transformation*, (b) *technological transformation*, (c) *technology*, (d) *digital age*, (e) *diversity*, (f) *digitization*, (g) *technological tools*, (h) *online learning tools*, (i) *school* or *classroom*, (j) *technology transformation*, and (k) *principal* or *administrator* or *leaders* or *leadership*. The sources helped me identify the concepts that school leaders used to implement technology within the classroom for instructional and learning purposes. Through a thorough review of these sources in the context of the research question and topic of this project, I identified several significant areas: (a) the need for effective digital transformation, (b) blended learning structure, (c) active participation in the student body, (d) professional development, (e) support and training for teachers, (f) identifying grades and subjects that can benefit from technology

integration, (g) academic growth, and (h) school leadership involvement. Section 2 concludes with a summary of the findings and transition to the next section.

Digital Transformation

Technology adoption has become a standard practice for most organizations, with digital transformation altering traditional work methods (van Meeteren et al., 2022). As the world undergoes rapid technological evolution, school leadership must adapt to and accommodate the needs of students and teachers (Lien et al., 2023). This adaptation is crucial to ensuring a smooth transition and keeping pace with the changing educational landscape (Condruz-Bacescu, 2023). The urgency and significance of K–12 school systems embracing technology to transition into the digital era cannot be overstated (Pata et al., 2022). The COVID-19 pandemic, a catalyst for rapid digital transformation, compelled schools to shift to online instruction, necessitating a change in teaching methods (Odak et al., 2021). During the pandemic, the education sector experienced a tremendous change in the effective use of technological tools (Gopalkrishnan & Bedarkar, 2022). Educational institutions are implementing the digital transformation that creates a global bridge between educators, students, and countries to bring a new way of learning (Trinh Thi Phuong et al., 2023). Technology has become an integral part of classroom teaching methodologies in the digital era. Teachers must be creative to bring more active learning opportunities for students (Gorder, 2008). To succeed in digital transformation, leaders must identify and deploy practical solutions that ensure seamless technology integration.

Educational institutions revolve around how services are provided to students and create opportunities to utilize digital tools (Lacka et al., 2021; Pardo-Baldoví et al., 2023; Pozos-Pérez et al., 2022). Technological transformation requires pinpointing digital tools, such as cloud-based collaboration platforms; assessing the readiness of current IT infrastructure, including network scalability and cybersecurity measures; and allocating resources, such as skilled personnel and budget, for immediate implementation. The key to a successful transformation is solid support from all stakeholders who rely on users for implementing technological changes effectively.

The changes are necessary across every educational setting, affecting students and teachers from all levels (Korkmaz & Toraman, 2020). Digital tools have been developed to meet the needs of school leaders seeking to implement growth (Alenezi, 2021). Transforming school systems with technology created gaps in the digital world; however, the transformation also emerged with additional methods for deriving educational services (Mospan & Sysoieva, 2022). Transforming into a technological world is a learning process that must be embraced by everyone who has to implement the process within their scope of work; teachers have their learning curve with technology and how that changes their teaching method (Miranda Veiga & Valente de Andrade, 2021). Furthermore, every stakeholder's involvement is crucial for a positive outcome of the technological transformation. School leaders must have the teachers' support and input to have a higher chance of succeeding in integrating technology. Educators with experience in technological tools have a higher chance of utilizing technology in their classrooms

(Gorder, 2008; Odak et al., 2021). Change is difficult, and getting your stakeholders to agree to the transformation is more difficult.

Digital Tools

Understanding and implementing digital transformation stems from how the organization, staff, and procedures evolve to new and improved working methods (Trinh Thi Phuong et al., 2023). Technology has emerged in the educational sector by introducing tools that can provide resources on how people teach (Shukla & Jacob, 2022). A critical factor of digital transformation is the digital tools needed to transform and integrate solutions that can provide services. Technology has created various means on how people can utilize tools to change pedagogy (Trinh Thi Phuong et al., 2023). Having the appropriate digital tools is crucial to promoting a positive academic experience among students (Rahaman & Rahaman, 2020). In the educational setting, digital tools are not only tools but also gateways to a more engaging and interactive learning experience.

The use of technology within the classroom brings forth creative ways that provide instructions for students to be active and eager to learn. Likewise, digital tools empower teachers and students to tailor their learning environment to their needs, enhancing the learning process (Odak et al., 2021). Educational digital tools promote student engagement and positive academic performance by utilizing interactive and effective methods that enhance the learning environment (Rayan & Watted, 2024). School leaders utilize the use of various digital tools such as a) one-on-one devices such as laptops and iPads and b) EdTech tools, which include educational software programs

and devices such as smart devices (Pardo-Baldoví et al., 2023; Terrenghi et al., 2019; Trinh Thi Phuong et al., 2023). As technology integration continue to evolve, persistent research is necessary to help how school leaders can effectively direct the implementation of digital tolls to support teaching and learning.

Technology continues to grow to bring change to society in various ways, including "artificial intelligence, digital twin, and virtual reality" (Wu Zunmin & Jiang Guiyou, 2022, p. 583). The changes that the world experiences through technology make teaching different. School leaders have to implement improved teaching methods to enhance the learning experience for students and get them to be actively engaged in the learning process (Terrenghi et al., 2019). School leaders found that incorporating technology and AI tools within their instructional services helped them advance in their academic goals and be able to prepare future generations to move onto the outside world (Gopalkrishnan & Bedarkar, 2022). School leaders also found that digital tools are practical for achieving academic standards in the learning environment (Terrenghi et al., 2019). Technology integration helps school systems identify the most appropriate solutions for an effective outcome.

One-on-One Devices. Many technological solutions have been integrated within schools to positively impact teaching and instructional service delivery. Digital devices have provided practical learning solutions and advocated student engagement and active learning (Pozos-Pérez et al., 2022). Schools utilize various digital devices such as iPads, laptops, and other digital tools for student use within classes by offering one-on-one device options to improve academic growth and ease of working on assignments,

assessments, and other educational aspects (Bixler, 2019; Condruz-Bacescu, 2023; Hall & Lundin, 2024). Moreover, various EdTech tools use these devices to support school leaders in enhancing engagement and fostering active learning.

EdTech Tools. The K-12 school system has transitioned in how technology delivers instructional services and learning processes. EdTech tools have been introduced to the K-12 school system to incorporate various educational technologies, such as digital learning, smart devices, and multiple collaborative tools that can help improve teaching, enhance learning opportunities, and create systemic solutions for school leadership (Kim et al., 2024). Every school has unique needs to identify, whose specific requirements can be solved by EdTech tools. Schools have integrated various educational technologies into the academic plan and the pedagogical methods (Tuma, 2021). Students experience a positive learning experience with active engagement to improve academic performance. For example, teachers use gamification tools such as Kahoot to motivate students to interact with and learn the materials delivered (Rayan & Watted, 2024). School leaders can achieve successful technological transformation with not only these tools but alsothe correct IT infrastructure and support.

IT Infrastructure

Schools need a strong IT infrastructure that can provide the necessary support for technological needs. Each system has challenges and barriers; therefore, schools must have appropriate solutions and comprehend the needs to provide what works best (Aditya et al., 2021). Schools must also provide an adequate system that includes sufficient network system, device requirements, software solutions, and cloud services that can help

boost instructional services for teachers and students. The continuous use of technology is solely based on a suitable infrastructure that provides the necessary support to run the systems (Animashaun et al., 2024). Schools must therefore have a process to identify the importance of maintaining and sustaining a sufficient platform that helps teachers and students integrate technology within the classroom (Abbasi Kasani et al., 2020). Along with the much-needed infrastructure to run a system within the school, school leaders must provide teachers and students with the necessary resources to support and provide smooth functionality.

Resources

Schools must have adequate resources to implement and sustain technology for classroom activities. Schools constantly add new technological resources to the classroom learning environment (Miranda Veiga & Valente de Andrade, 2021). Such measures include the provision of functioning devices compatible with instructional software, sufficient support for troubleshooting technical issues, clear tutorials offering step-by-step instructions for system usage, and staff readily available for immediate assistance (Abbasi Kasani et al., 2020). Teachers face challenges without sufficient learning tools and resources (Animashaun et al., 2024) that can help students' academic performance and engagement. For successful technological integration, teachers and students need a seamless experience to achieve positive educational outcomes. Adapting technology requires a framework, resources, knowledge, support, training, and societal change (Shukla & Jacob, 2022). Across all educational institutions, various technological solutions have been adopted to support academic growth in different ways. With

technology, varied educational materials have been created in the form of "videos, digital books, podcasts" (Tuma, 2021, pp. 231-235) and online textbook teacher tools that are readily available with online content access. Furthermore, in K-12 systems, blended learning approaches have been utilized to engage students, including those as young as kindergarten, helping to foster their educational development.

Blended Learning Structure

Schools are changing how they deliver educational services to bring more creative methods to get active participation from students. Technological solutions bring positive outcomes to schools and help educators utilize tools and resources to improve academic achievement. Instructional services are offered in various methods, including blended learning, which offers digital and printed material (Bedenlier et al., 2020). Educators are taking the initiative to identify how to get students to actively participate in the classroom by integrating various technological solutions. Blended learning structures with technological solutions can bring positive and negative outcomes for students. More importantly, any technological aspect needs educators to be well-informed, trained, and supported to deliver instructional services utilizing technology (Bedenlier et al., 2020). Therefore, ongoing research is needed to examine how school leaders can ensure educators receive the necessary training and support to implement technology effectively and maximize student engagement and achievement.

Many schools have adopted a blended learning structure to enhance the instructional process in the classroom. Blended learning combines in-person and online teaching methods using textbooks with online tools, allowing students to participate in

live lessons, access textbooks digitally, and submit assignments online (Condruz-Bacescu, 2023). While this approach has been used in higher education for years, COVID-19 has impacted the educational system, recently gaining traction in K-12 secondary schools (Jie Hou & Junjie Xue, 2023). Blended learning platforms enable students to track their submitted work and access supplementary resources beyond the textbook. For teachers, digital platforms such as virtual textbooks streamline content assignments, grading, and tracking of student submissions, improving efficiency (Condruz-Bacescu, 2023). School leaders can also leverage data analytics from these systems to monitor standards being taught and identify areas where students need additional support. Technology has provided the means to support various teaching methods, which has allowed teachers to explore new learning formats that can produce effective learning for students (Petchamé et al., 2023). Blended learning exposes students to diverse teaching methods, enhancing their understanding of the subject through technological solutions (Condruz-Bacescu, 2023). This structure encourages active student participation, keeps them engaged with interactive tools, and fosters a more dynamic learning environment.

Student Engagement

The use of technology has emerged in recent years in every industry, including educational institutions. Schools are implementing various technologies to create a blended learning structure and other classroom resources to excel in academic growth. Classrooms have integrated technological solutions to empower the learning process where students can actively participate (Wu Zunmin & Jiang Guiyou, 2022). School-aged

students are familiar with technology usage and can adapt quickly to the tools used within the classroom for instructional purposes (Ledesma & Izquierdo, 2020). Students find that technological solutions are acceptable and accessible for educating themselves. With the implementation of digital tools within the classroom, the learning process has transitioned from work-centered to student-centered, bringing an inclusive environment, providing a digital education is innovative, efficient, and inventive to help the growing population of young people (Aggarwal & Mehndroo, 2022). Students actively participating during classroom instruction enable them to understand the concept being taught, build confidence, and develop academic excellence. Technology has immersed students in a new era of learning more effectively in a classroom to achieve better outcomes in their academic journey (Pardo-Baldoví et al., 2023). School leaders have previously identified the significance of integrating technology within the classroom (Bedenlier et al., 2020; Ní Shé et al., 2023). Engaging students actively enhances their understanding of concepts, fosters creative problem-solving, and boosts academic performance.

Teaching a classroom using the traditional method of a lecture style does not provide students with the necessary tools for being proactive in learning the material. Lack of understanding of the material being taught creates obstacles for learners, hindering their ability to tackle academic challenges and achieve growth. However, active participation from the student helps break the barrier and achieves positive results in the learning process. For the most part, this new change of technological transformation has helped students be more involved (Pardo-Baldoví et al., 2023; Pozos-Pérez et al., 2022). School leaders who have incorporated the use of digital tools within

the classroom encounter much higher participation from eager students (Donham et al., 2022). Using technology within the classroom as part of the instructional process likewise increase students' interest in learning and participating. Students have active participation and learning through various digital tools which provides an inclusive and enhanced learning environment (Khukalenko et al., 2022). Ultimately, it's up to school leaders to thoughtfully guide technology integration in ways that not only boost student participation but also create classrooms where every learner feels included and engaged.

Technology can enhance student participation with a positive outcome in the learning collectively (Bedenlier et al., 2020). School leaders can implement technology use by choosing what works best within the digital world. Digital tools include the features of learning management systems, surveys, online assessments, videos, digital presentation tools, and other Edtech tools (Donham et al., 2022). The efficient use of technology comes with the knowledge and skills that would be acquired through training and professional development (Bedenlier et al., 2020). School leaders need a comprehensive plan for training and offering professional development to staff and teachers, ensuring they effectively integrate technology into a positive instructional system.

Professional Development

School leaders constantly look for ways to enhance the quality of education provided for students by advancing the instructional services and additional resources for teachers. Learning is for everyone, and integrating technology within the classroom is a learning step for teachers; students' first impression must be a positive interaction with

teachers (Zengin, 2023). Teachers need to learn the content, concepts, pedagogical methods, and curriculum to teach effectively. The use of technology is connected to the teachers' willingness to use it within the classroom. The more teachers are empowered to use technology, the more positively the outcome will impact the student's learning process (Miranda Veiga & Valente de Andrade, 2021). To provide the necessary support for teachers, school leaders implement professional development as a resource for training (Liao et al., 2021). Professional development is provided year-round so that teachers can be well-prepared to deliver instruction that positively affects students' academic performance (Martin et al., 2017). The use of technology in the classroom is in addition to the regular teaching methods, which not everyone is comfortable implementing.

Therefore, providing professional development to help teachers utilize digital tools and technologies in the classroom for instructional purposes helps the process transition smoothly (Baroudi & Shaya, 2022). Learning to use technology is a continuous process that teachers need to know and train themselves to integrate within the teaching methods to enhance student performance (Liao et al., 2021). School leaders must provide the necessary support for teachers to effectively use technology by having access to continuous professional development and resources (Rath et al., 2021). Continuation of professional development for faculties will help continue educational services despite any setbacks and challenges incurred (Odak et al., 2021). Teachers will gain knowledge and expertise using technological solutions to support their instructional needs.

School leaders work throughout the year every school year to identify how teachers are trained and introduced to various technological solutions that can effectively support their instructional needs. Teachers must educate themselves on technology and find technology helpful in instructional services. Acquiring the knowledge of technology helps the integration to be smooth and powerful when teaching students (Zengin, 2023). Professional development for K-12 teachers to use technology integration within their classroom has various factors that can help, such as (a) digital tools, (b) pedagogical changes, (c) software and systems, (d) classroom management, (e) differentiation of instructional methods with technology, (f) analytics, and (g) internet usage. The primary goal is to emphasize the importance of professional development, ensuring that teachers understand the different tools and platforms available for effective teaching (Martin et al., 2017). The key objective is to equip teachers with the necessary tools to create a positive academic experience that fosters students' academic growth. Offering professional development for teachers goes beyond a few training sessions; they need ongoing support and guidance to effectively integrate technology into their teaching.

Support and Training

In addition to providing professional development, school leaders incorporate ongoing support and training for teachers to integrate technology use within their instructional services. Most traditional teachers are unfamiliar with using technology in classroom instruction and need support (Trinh Thi Phuong et al., 2023). School leaders continuously look for ways to enhance technology's effectiveness and better maintain the continuity of technology's usage among teachers and students. Studies have found that

having previous knowledge can help with a smooth transition to technological solutions (Odak et al., 2021). Similarly, teachers and school staff not having enough experience in technological solutions (McClanahan, 2017) bring a negative aspect of technological transformation. Implementing technology is complicated for schools when teachers and students are the end users. Transitioning to technology is a challenge for most teachers with limited knowledge of digital platforms (Mospan & Sysoieva, 2022). The IT department under the leadership of school leaders has to come up with solutions that can help and support teachers and students in using technology effectively. Technology integration has proven efficient among students and teachers; however, adequate training and resources make a big difference in the outcome (Srivastava et al., 2014). With the immersion in the rising technological aspect of digital solutions, teachers agree that having ample training and resources for technological solutions is necessary (Deroncele-Acosta et al., 2023). Teachers must receive support and training programs necessary to properly use technology within the classrooms and other instructional needs for K-12 schools.

Support Programs

Providing support for teachers is a process established within the school leadership team, including the principal and other administrators, to give teachers the necessary tools to provide a better teaching experience (de Groot-Reuvekamp et al., 2018). Various departments within schools have their own support system. Technology now plays a vital role in teaching, with support programs designed to meet the specific needs of both teachers and students as they navigate various digital tools in the

classroom. Teachers gain confidence in using technology through support programs that help achieve the goal of implementing technology within their classrooms (Liao et al., 2021). Most schools have an IT department that establishes a support system offered to their staff, which includes device support, software support, system support, and, more importantly, connectivity and login support. Many of these IT departments incorporate a ticketing system to keep up with requests for technical assistance from teachers and students. The end users look for immediate support when they need troubleshooting issues during instructional times within the classroom. School leaders must invest in the support system within IT to fully integrate technological solutions and have an effective plan to continue. School leadership support and dedication bring motivation for teachers to utilize new tools within their classrooms (Baroudi & Shaya, 2022). Teachers and students rely on the guidance and help from the IT team to help navigate their technical issues confidently. Students show interest in using technology in their learning process which helps teachers use various digital tools to improve their academic growth (Hébert et al., 2021). Some schools experience issues with students having a better understanding of technology compared to teachers, which puts the teacher at a disadvantage because of loopholes that students may utilize. Teachers not having adequate knowledge and skills to use technological tools can lead to interference in the learning process (Baliram et al., 2021). The IT team supports the teachers in identifying and helping to resolve issues tactically to disable any workarounds students may have found. The school leadership team identified resources that can help teachers enhance their skills using various platforms by creating training programs, a learning process for teachers.

Training Programs

Providing adequate training can prepare teachers to use technology without losing instructional time within the classroom because of eliminative issues if detected early on (Dunfee et al., 2024; Makarova & Makarova, 2018). With immersion in the rising technological aspect of online solutions, teachers agree that having ample training and resources for technological solutions is necessary (Deroncele-Acosta et al., 2023). The use of technology brings a new pedagogical method that teachers can incorporate within the classroom for instructional purposes (Trinh Thi Phuong et al., 2023). School leadership must have successful teacher training programs that allow them to learn the procedures and technical terms. Practical training for teachers helps implement technological services as they integrate the instructional methods (Liao et al., 2021). Many programs are tailored based on the systems that are implemented. Schools have made their own process of identifying digital tools that work best for their needs and are advanced in implementing the use of technology (Baliram et al., 2021). As technology continues to advance, school leaders play a critical role in providing ongoing, hands-on training that equips teachers to confidently integrate digital tools into their instruction.

Every technology platform or system has a specific training program that provides a training session for the end users to become accustomed to what the platform provides. During the implementation of the system or technological solutions that school leaders integrate within the classroom, one of the steps is to provide training to end users to grasp the technical aspects of the system. Providing the training needed for teachers can be an effective way of ensuring the digital transition can be a positive outcome for students and

teachers (Yanwar et al., 2022). School leaders plan for teachers to attend scheduled training sessions during orientation and professional development days to enhance their knowledge and skills in how to use technology. School leaders also establish training programs for teachers to enhance their expertise and understanding of technological platforms (Ali et al., 2020). Training teachers with the tools they need to succeed in the classroom can help them excel in students' academic growth based on the instructional services a teacher can provide students.

Academic Growth

School leaders look for solutions to address the students' academic performance and find a way to excel in the need for alternate solutions. The new era leans towards digital platforms and tools that create a more comprehensive resource pool for students to learn in a diverse approach. Technology has built a foundation in various methods to provide the best options for educational paths and learning styles (Begaliyeva et al., 2022). Teachers can use technology to challenge students to identify their academic performance and understand their needs. Using technology within the K-12 school environment can help teachers and students identify tools to complement the subject matter taught with textbooks. Students experience a positive outcome involving technology in learning (Trinh Thi Phuong et al., 2023). Transforming our teaching methods helps our student body as technology empowers and enables the world (Hubeňáková et al., 2020). With technology, students have to incorporate their learning strategies in the classroom using various digital tools (Trinh Thi Phuong et al., 2023). Technology has allowed students to think outside the box and be creative. Likewise,

technological solutions have enhanced the learning environment for students. Effective use of technology has shown an increase in student academic performance (Ran et al., 2021). More teachers are trying to find innovative solutions to expand the teaching method and engage students more in learning (Romero-Ivanova et al., 2021). Currently, students are comfortable using digital tools for their academic needs.

Active learning can be achieved when students are engaged and participate in the classroom which can lead to academic achievements (L. Wu et al., 2023). Studies have proven that students learn, engage, and grow academically using technology (Baliram et al., 2021; Trinh Thi Phuong et al., 2023). The use of technology within the classroom can help students gain knowledge that helps with their learning process (Yanwar et al., 2022). Students are more inclined to be involved in learning and retain information through technological tools (L. Wu et al., 2023). Research shows that students were able to adapt to the digital transformation, which allows for the continuation of academic progress despite any challenges faced (Bogdandy et al., 2020). Technology has provided flexibility for every student's success in education as long as the resources are readily available (Gopalkrishnan & Bedarkar, 2022). Gaining academic growth for students is a crucial component of their academic journey as well as the school's growth. Students have shown significant growth in their learning process when technology is implemented within the classroom for instructional purposes (Wang & Burdina, 2023). School leaders have a high priority in assuring that students learn and have a positive academic performance.

School Leadership

School systems provide additional support for teachers to implement technology in instructional services. School leadership constantly looks for digital tools and opportunities to bring innovative classroom integration solutions (Liao et al., 2021). Technology has enabled more opportunities for a wider academic community to gain pertinent education (Aditya et al., 2021; Bogdandy et al., 2020). Organizational transitions occur with leadership guidance as well as set policies that promote the change. School leaders must provide the support needed for teachers to transition to using technology in their classrooms (L. Wu et al., 2023). School leaders must come up with policies that can help technological transformation (Göçen et al., 2020). Each change has obstacles and challenges that all stakeholders who are affected by the transition of new processes or solutions need to carefully consider (Aditya et al., 2021). The school leadership team has to focus on the steps to take when making changes. Many schools have gone through various stages of technological transformation, mainly focused on training the staff and students (Pata et al., 2022). Integrating technology within the classroom has positive outcomes for teachers and students (Göçen et al., 2020). Ultimately, effective technology integration relies on school leaders who prioritize careful planning, provide consistent support, and establish policies that help both teachers and students adapt and succeed in a changing educational landscape.

The school leadership team is responsible for constantly finding solutions to make the necessary transition and adjustments and finding a middle ground to support teachers and students (Lien et al., 2023). School leaders can identify the technology to adopt in the

classroom based on the tools that have been utilized, the reason for a need for technological tools, and the people who implement technology in the classroom (Appova et al., 2022). If schools want a successful digital transformation, they must apply phases of the transformation to achieve a positive outcome that are beneficial at an organizational level (Pata et al., 2022). The school leadership team is more significant in implementing technological solutions and guiding teachers to change as needed (L. Wu et al., 2023). School leaders must comply with the systems and processes needed to implement technology within the instructional services and bring valuable data to support academic growth. The data can help school leaders and teachers identify measures that the teachers can effectively implement to enhance academic achievement. (Liao et al., 2021). The education industry has become more valuable with the technological transformation that has taken place in the K-12 schools.

Conceptual Framework

The conceptual theory of Technology Integration Matrix (TIM) for this project is rooted in the Florida Center for Instructional Technology in 2005 by James Welsh, who provided a tool to assess and enhance the technology integration within the K-12 classrooms (Welsh et al., 2011). TIM allows the school leadership team to identify and utilize how to use technology to improve academic performance (Ruman & Prakasha, 2017). The framework helps identify the process that school leaders can effectively implement within the classroom with teachers on how to adapt technology (Dunn, 2022). The TIM framework can help teachers create processes within their instructional services to integrate technology and have a purpose (Phillips, 2018). The framework has five

characteristics and five levels to support classroom technology integration (Welsh et al., 2011). Characteristics: (a) active, (b) constructive, (c) goal-directed, (d) authentic, (e) collaborative, along with the five levels:

- entry
- adoption
- adaptation
- infusion
- transformation

TIM possesses attributes that can create the path to successfully identify and explore the logical steps school leaders can utilize for teachers in a learning environment. Additionally, these attributes are linked with five levels within the classroom to focus on adapting to technology (Welsh et al., 2011). School leaders look for ways to identify what can be easily adapted to enhance technology integration for teachers within their instructional services.

Transition

With information technology leaping in multiple areas of our lifestyles today, schools must be ready for the future of student learning with the right tools to support their academic journey (Andriushchenko et al., 2021; Hubeňáková et al., 2020). Changing the teaching methodology helps students be more empowered with technology as they move on to outside work (Hubeňáková et al., 2020). As schools change their ways of delivering instructional services to students, this research aims to identify how technology helps teachers and students overcome the barriers from traditional teaching

methods with textbooks and workbooks. Some schools find this transformation challenging and hard to implement because of the stakeholders' lack of knowledge or acceptance. Teachers and school staff not having enough experience in technological solutions (McClanahan, 2017) bring in a negative aspect of technological transformation. This project aims to call forth methods that schools can utilize to implement digital transformation with the right tools and resources to help transform classroom teaching pedagogy.

Section 3: The Project

Section 2 provided a thorough literature review on the effective use of technology in K–12 school systems. Section 3 includes the methodology and design of the project, with a detailed explanation of the ethical approach to collecting data, recruiting participants, designing interview questions, and ensuring the reliability and validity of the study.

Project Ethics

The crucial element of qualitative research is that the researcher has an important role to play in collecting and analyzing data to align with the research questions (Yin, 2018). As the researcher, I collected and analyzed the data. I followed ethical practices while collecting data from participants to be fair and just (see Yin, 2018). Researchers must follow certain rules of conduct that create an understanding between the participants (Yin, 2018). The fundamental ethical principles include fairness, impartiality, the establishment of trust and respect, the protection of data confidentiality, and the prevention of harm to all participants involved (Saunders et al., 2019).

I obtained approval from the Walden University Institutional Review Board (IRB: 04-23-25-1168912). After receiving confirmation from IRB, I started to gather information of nonpublic K-12 schools in the State of Maryland. According to the Belmont Report (Protections, 2018), guidance and instruction must be clearly stated for all participants before conducting any research. In the current project, I chose school leaders from nonpublic schools in the state of Maryland. These participants were informed of the process for conducting interviews and how the data collected would

answer the research question, to avoid ethical issues and to ensure participants were aware of their option to withdraw from the project at any time. An informed consent form was provided to each participant prior to the interview. Each participant was informed verbally before starting the interview of the option to opt out at any time if they felt uncomfortable. Participants were informed that a report could be shared if requested. All records collected will be safeguarded for five years to protect participants' privacy and identity.

Nature of the Project

Researchers choose various research methods based on the research topic and the expected outcomes they aim to obtain (Hammarberg et al., 2016; Jamshed, 2014). Quantitative researchers obtain large data sets to compare inconsistencies, which are quantified using various data analysis tools (Saunders et al., 2019). A mixed-methods study combines qualitative and quantitative data to triangulate the results from both methods, enhancing reliability and validity (Jamshed, 2014; Saunders et al., 2019). The qualitative method focuses on individual viewpoints and personal experiences related to a topic (Hammarberg et al., 2016). The current project required information that could be collected and adapted to capture the technical experiences of teachers and students to identify strategies that helped individuals become more productive. Therefore, the qualitative method was used to gather data through semistructured interviews, which revealed commonalities affecting day to day issues involving technology (see Jamshed, 2014). The quantitative method focuses on normalized outcomes, which was unsuitable for the current project because the focus was on issues rooted in personal experience. For

the same reason, mixed-methods designs were inappropriate because the systematic data collection process of the quantitative approach was not needed to answer the research question.

The research design was a pragmatic inquiry used to answer the research question in this qualitative project. The qualitative method was appropriate because it provided opportunities to explore K–12 schools' successful technological transformation strategies. This research focused on identifying schools that had effectively implemented technology integration and examined its positive impact on teachers and students. A pragmatic design helped me address the focus of the project, including (a) practical understanding; (b) the interrelation between actions, exposure, and information; and (c) observation of the implementation process (see Kelly & Cordeiro, 2020). I followed an inductive approach to identify effective strategies that school leadership applied to classroom technology use.

Population, Sampling, and Participants

For this project, participants were chosen from nonpublic schools in the state of Maryland, where technological transformation had impacted the schools' educational needs and academic growth. School leaders from these schools were selected to identify the course of action taken to transition from traditional teaching methods to integrated technology for instruction in the classroom. These school leaders had shifted from traditional classroom methodologies to technology-integrated instructional services. The selected schools had utilized various digital tools, such as online textbook platforms and other EdTech tools, to deliver instruction within the last five years.

For this qualitative project, I employed nonprobability sampling to select participants, focusing on the project's purpose (see Saunders et al., 2019). I began by selecting five members of school leadership teams across nonpublic schools in the state of Maryland who had been involved in the transition to technology services in grades K–12. This process continued until data saturation was reached, when the data collected yielded no or limited new information (see Saunders et al., 2019). The chosen participants had undergone the implementation of technological solutions, received support and training, and worked with various digital tools to achieve the desired academic and operational growth in classrooms and instructional services (see Fields et al., 2021). One of the key challenges in implementing digital transformation was securing compliance and engagement from all stakeholders involved in the process.

These school leaders oversaw teachers who utilized both traditional and modern teaching pedagogies that involved technology for instructional purposes. Over the past few years, they and their teachers had undergone extensive training and transitioned between the two teaching methods. Participants provided in-depth insights into how they adopted technological solutions within the classroom and the resulting impact on their instructional practices. The process of selecting school leaders for this research was guided by the level of technology integration used across all grade levels and subjects in their schools. Participants had successfully integrated digital tools, provided consistent training and support, and ensured their teachers were confident and comfortable using technology in instructional settings.

Semistructured interviews were conducted using the Zoom platform to gather data. All interviews were recorded and transcribed using Otter.ai. The semistructured interviews consisted of open-ended questions designed to elicit detailed responses and add depth to the research based on the participants' experiences.

Data Collection Activities

One of the most prominent methods for conducting qualitative research is the collection of data through interviews. I conducted semistructured interviews to answer the research question in this qualitative pragmatic project. Collecting data through interviews served as the primary source of evidence (see Yin, 2018) for the research project, which aimed to identify issues and opportunities that could be implemented in real-world situations. The interviews explored the methods and resources that supported teachers and students in excelling academically through the use of technological teaching methods, as well as the outcomes school leaders observed in terms of classroom efficiency and improvements in instructional services. During the interviews, I used open-ended questions based on the participants' responses to add depth and value to the research.

I selected school leaders from non-public schools in the State of Maryland who had implemented technological solutions in brick-and-mortar and online learning environments. These participants had worked within their school systems using both traditional teaching pedagogies and current instructional practices that incorporated technology. Over the past few years, they had undergone extensive training and successfully navigated the transition between these two approaches. They provided an in-

depth perspective on how teachers adapted to technological solutions in the classroom and the impact of this shift on their instructional methods.

Interview Questions

This interview examined the methods and resources that helped school leaders transition from traditional to technological teaching methods, as well as the outcomes they had observed in terms of efficiency and classroom instruction improvements. Please refer to Appendix A for the interview questions that will be used during the data collection process with the participants.

Data Organization and Analysis Techniques

The thematic analysis identified key concepts and categories that revealed recurring trends within the research context (see Saunders et al., 2019). Using the interview transcripts, the most effective way to identify connections to the research question was through the thematic analysis process. Using Artificial Intelligence (AI) platforms such as Otter.ai, I transcribed and reviewed the interviews to identify emerging themes and codes. These themes and codes were derived from areas related to technological transformation within teaching pedagogy, how school leadership perceived the transition, and the impact they experienced.

I began my analysis by aligning the responses to key questions about the transition to technological systems within the classroom with each interview. Aligning the themes and codes allowed me to identify patterns across participants (see Yin, 2018). The thematic analysis was then connected to the literature review, linking prior research findings with the themes that emerged during the data collection phase of this project.

Reliability and Validity

A research project can gather valuable information by conducting interviews, which provide reliable and valid data (see Saunders et al., 2019) that offer a deeper understanding of a topic from various viewpoints. In research, reliability and validity are critical components of the quality and authenticity of the findings (see Yin, 2018). By incorporating interviews, researchers can gather diverse perspectives that add depth to the study and strengthen the reliability and validity of the findings.

Reliability

Reliability helps measure data consistently, no matter how often the same data is analyzed (see Saunders et al., 2019). The data was collected using an interview protocol to gather reliable information for the project. Verification process of the data to ensure its reliability, and the collected data will be stored securely for five years to maintain the confidentiality of all participants.

Validity

Validity brings perfection to the research, ensuring the outcome is accurate (see Yin, 2018). When collecting data through semi-structured interviews, the data may face multiple issues related to dependability, bias, diversity, transferability, and credibility (see Saunders et al., 2019). Validity is based on the accuracy of the collected data, free from the issues mentioned above. A researcher can avoid any ethical issues and bias in the collected data by having participants review the data from the interviews. I allowed participants to review the interview data (Saunders et al., 2019) to establish a trusting relationship among all parties involved.

Transition and Summary

The qualitative research method is designed as a pragmatic approach to identify effective strategies K-12 schools can implement in technological transformation within the classroom. School leadership from non-public schools in the State of Maryland was identified as participants to collect data through a semi-structured interview. A thematic analysis was employed to identify themes and codes that could provide a link to previous research in a similar context. Section 3 concludes with an assessment of the reliability and validity of the collected data, which will help identify the findings and recommendations for future research opportunities, as discussed in Section 4.

Section 4: Findings and Conclusions

In this section, the key findings and concluding insights from the qualitative project are presented, answering the research question: What strategies can K-12 school leaders apply to effectively improve technology integration within the classroom, thereby enhancing student learning outcomes? To answer the research question, I adopted qualitative methodology utilizing a pragmatic inquiry design. This approach was selected because it aligned with real-world educational contexts and emphasized actionable, practice-based strategies. The research focused on nonpublic K–12 schools in the state of Maryland that had effectively implemented technological transformation initiatives. Particular attention was given to identifying strategies that demonstrated a measurable and positive influence on instructional practices and student learning outcomes.

Rooted in pragmatism, the project examined three core elements: (a) the development of a practical understanding of effective integration; (b) the interrelationship between leadership actions, digital exposure, and school culture; and (c) the direct observation of procedures and leadership behaviors that contributed to successful outcomes (see Kelly & Cordeiro, 2020). Data were collected through semistructured interviews with school leaders and analyzed using thematic analysis. This method allowed for the identification of recurring patterns, categories, and themes across participant responses. Through this inductive process, the project revealed key strategies that reflect the challenges and successes of implementing classroom technology at the leadership level.

Thematic Analysis

The findings were organized into key themes that answered the research question. Each theme revealed the strategies that school leaders have used to successfully support technology integration in their schools. Two tables are included to provide a clearer view of how the data were analyzed. Table 2 offers an overview of how participant responses aligned with the five dimensions of the TIM, illustrating the depth and breadth of integration practices observed across different schools. Table 3 provides a description of the coding process, illustrating how initial codes derived from the interview data were organized and refined into broader themes. These tables illustrate the progression from raw data to meaningful insights. The section concludes by synthesizing these findings, drawing connections to the TIM framework and existing literature, and highlighting the professional significance and broader social impact of the strategies uncovered.

Table 2

Coding Summary by TIM Dimension

TIM dimension	Aligned theme	Evidence from interviews
Active learning	Student engagement	"Students now drive their own learning using tools like Padlet."
Collaborative learning	Use of LMS, digital equity	"Google Classroom helped our students work in real-time with classmates."
Constructive learning	Professional development, leadership	"We use feedback cycles to support teacher learning and growth."
Authentic learning	Student engagement, tool evaluation	"We focus on tech that makes learning relevant to real-world issues."
Goal-directed learning	Filtering policies, PD, leadership	"We set clear goals before implementing any digital tools."

Note. This table aligns participant responses with the five dimensions of the technology integration matrix, highlighting how school leaders support integration across each domain.

Table 3

Thematic Coding Matrix Sample

Interviewee	Theme	Subcode	Notable quote
P1	Teacher resistance	Digital anxiety	"There's still hesitation with our older teachers."
P2	LMS usage	Google Classroom	"It became our communication backbone."
P3	Digital equity	Device distribution	"We checked that every student had a Chromebook and Wi-Fi."
P4/P5	Professional development	Personalized training	"We offered sessions at beginning, intermediate, and advanced levels."
P1/P5	Leadership modeling	Vision alignment	"Staff followed when they saw I was learning the tools myself,"; "getting feedback from the staff and other stakeholders."

Note. The thematic coding matrix presents selected excerpts from five participant interviews, categorized by emergent themes and codes. Each quote provides an example of how K–12 school leaders described their strategies for integrating technology. Participants are identified using pseudonyms (P1–P5) to maintain confidentiality, in accordance with IRB guidelines.

Theme 1: Professional Development and Training

One of the most consistent and emphasized findings across all five interviews was the critical importance of continuous, differentiated professional development (PD). School leaders expressed that effective technology integration depends on teachers' comfort, skills, and confidence in using digital tools. This theme aligns with the constructive and goal-directed dimensions of the TIM, which stress the importance of learner autonomy and intentional instructional planning.

Participants shared multiple formats of PD, including after-school training, vendor demonstrations, one on one coaching, and peer mentoring. P4 noted "we offered sessions at beginner, intermediate, and advanced levels to make sure everyone could grow from where they were." P3 shared "some teachers had not even used a word processor effectively, we had to go back to the basics before introducing any tools." This finding confirms the literature that underscored the link between ongoing PD and successful tech integration (Darling-Hammond et al., 2020), Further reinforcing that self-efficacy shaped through relevant training is a cornerstone of digital transformation in schools (Ertmer & Ottenbreit-Leftwich, 2010). From a business leadership lens, this theme highlights the value of investing in human capital development and building internal capacity, an essential practice in educational and corporate environments. As organizations prioritize upskilling in the face of digital disruption, schools must offer adaptive learning opportunities to empower their teams.

Connecting Professional Development and Training to the Literature

A key contribution of this project is the emphasis on differentiated and sustained professional development as a lever for long-term change. Findings echo prior research that underscores the need to tailor training and coaching to teachers' experience levels and comfort with technology (Baroudi & Shaya, 2022; Baliram et al., 2021), yet this project adds depth by illustrating how ongoing leadership involvement and modeling create the cultural shift necessary for lasting adoption. In contrast to earlier concerns that framed technology as an external challenge to teachers (Condruz-Bacescu, 2023; Mospan & Sysoieva, 2022), the current findings suggest that with the right leadership approach, digital tools can become embedded, purposeful elements of daily instruction.

Theme 2: Student Engagement

Student engagement emerged as a fully saturated theme, with leaders emphasizing how digital tools created more interactive, personalized, and inclusive learning environments. Tools such as Seesaw, Padlet, and Kahoot were mentioned as vehicles to amplify student voice, especially for quieter learners. This theme maps onto TIM's active and authentic learning dimensions, which emphasize real-world relevance and learner agency.

As one participant noted, "Seesaw helped even our shy students find their voice" (P1). Another shared, "When students record their learning on Padlet, they reflect more deeply, it's more than just answering a question" (P3).

Connecting Student Engagement to Literature

These findings confirm prior research on the link between autonomy-supportive tech environments and increased student motivation (Al-Harbi, 2014). More recent studies (Christopher et al., 2023) highlight how engagement strategies using digital tools have become more personalized and student-centered post-pandemic.

The findings of this project support the view that digital transformation is not solely about tools but also about rethinking instructional practices and learning environments. This aligns with research emphasizing the potential of EdTech to promote active, student-centered learning when implementation is strategic and supported (Appova et al., 2022; Mukherjee et al., 2022). In terms of business relevance, this theme parallels customer engagement strategies. Just as businesses use digital tools to tailor user experiences and increase interaction, educational leaders are leveraging tech to meet students where they are, fostering deeper learning outcomes.

Theme 3: Teacher Buy-In and Resistance

This theme highlights the emotional and psychological dimensions of change management. While it was not universally mentioned, the theme was significant in the interviews where it did arise. Leaders pointed to post-COVID fatigue, generational tech gaps, and resistance to change as barriers to successful implementation. One administrator observed, “Some teachers are overwhelmed and prefer to stick with what they know” (P1), while another noted, “There’s still hesitation with our older teachers” (P2).

Connecting Teacher Buy-In and Resistance to Literature

This theme aligns with diffusion of innovations theory, particularly in managing transitions from early adopters to the early and late majority (Rogers, 2003). Through the lens of TIM, this theme reflects a constraint to the goal-directed and constructive dimensions; teachers who lack buy-in are less likely to implement purposeful, student-centered tech use. From a leadership perspective, addressing internal resistance mirrors organizational change management practices in business, where cultural readiness must be addressed alongside system changes. The findings contribute new insight into teacher well-being during technology adoption. Echoing recent concerns about teacher stress and burnout tied to rapid digital shifts (Dunfee et al., 2024; Kim et al., 2024), the findings show that teachers feel more confident and supported when professional learning is paced, practical, and clearly aligned with school-wide priorities. Rather than viewing technology integration as an isolated initiative, successful school leaders in this project approached integration as part of a broader effort to enhance instructional quality and foster a collaborative learning culture

Theme 4: Digital Equity and Access to Devices

All participants emphasized that equitable access to technology went beyond device distribution; access encompassed connectivity, training, age-appropriate implementation, and ongoing support. Such equity aligns with TIM's collaborative and authentic dimensions, emphasizing inclusivity and real-world application.

Leaders described efforts such as distributing hotspots, offering parent training, and rolling out devices in stages: “We didn’t give everyone a laptop at once. We started with middle and high school students and worked our way down” (P1; P5).

Connecting Digital Equity and Access to Devices to Literature

This theme is supported by foundational work on digital equity (Gorski, 2009), as well as by more recent studies (Tate & Warschauer, 2022), which highlights the growing digital divide in marginalized communities during and after the COVID-19 pandemic.

From a business standpoint, the challenge of having equitable access to technology in schools’ mirrors broader issues in workforce development, where both access and training are essential to creative inclusive and ready for the future. Just as access and training are critical for an equitable workforce, schools must ensure digital tools are accessible to all students regardless of background.

Theme 5: Use of LMS and Collaboration Tools

All participants highlighted the importance of learning management systems (LMS) and collaboration platforms in sustaining technology integration. Google Classroom, Seesaw, and Microsoft Teams were frequently mentioned as essential tools for both in-person and virtual instruction. This theme corresponds to the collaborative and goal-directed dimensions of TIM.

Participants noted that even after returning to in-person classes, these platforms remained central: “We standardized on Google Suite…not just to post assignments but to create interaction,” one leader said (P1). Another shared, “Now, even in person, they’re embedded in our day-to-day routines” (P2).

Connecting Use of LMS and Collaboration Tools to Literature

This aligns with recent research, which illustrates how the normalization of LMS tools during the pandemic continues to shape instructional design and school-home communication (Mukherjee et al., 2022). In the business world, this normalization is akin to enterprise systems that streamline operations and enhance collaboration across teams and departments.

Theme 6: Content Filtering and Digital Discipline

As technology became more embedded in instruction, leaders faced challenges around maintaining student focus and ensuring responsible use. Filtering tools like GoGuardian and restrictions on entertainment websites were common strategies. These strategies align with TIM's goal-directed component, which emphasizes structured and purposeful use of technology.

Participants shared stories of students misusing devices and concerns about emerging issues such as AI-assisted cheating: "Some students started using AI tools to write assignments, it became harder to know what was their original thinking," one participant noted (P2).

Connecting Content Filtering and digital Discipline to Literature

These stories echo findings based on recent research (DeBacker et al., 2024), which explored the need for digital ethics education as a core component of modern schooling. Business organizations face similar challenges with digital compliance and cybersecurity, highlighting the shared need for proactive policy-making.

Theme 7: Role of Leadership

Leaders played an active and transformative role in technology integration. They modeled tech use, co-planned professional development, and provided emotional and logistical support. This theme reflects TIM's constructive and goal-directed elements, where leadership creates the conditions for thoughtful tech use.

"If the leadership team isn't using the tools or talking about them, the teachers don't feel like it's a priority," one participant explained (P5). Another added, "We sat with them during implementation, listened to their feedback, and adjusted our timelines" (P4).

Connecting to the Role of Leadership Literature

The findings of this project add to the growing body of research on digital transformation in education by highlighting the essential role school leaders play in guiding effective technology integration. While prior studies have explored large-scale challenges of digital adoption in higher education and international contexts (Aditya et al., 2021; Aggarwal & Mehndroo, 2022; Animashaun et al., 2024), this research offers a focused view from K–12 non-public schools in the United States, examining leadership practices that directly influence teacher engagement, classroom application, and school-wide consistency.

Recent literature emphasizes that visionary leadership and modeling are crucial for embedding technology into school culture (Baytiyeh, 2021). Leaders in this project reinforced this shift by standardizing platforms, aligning tech use with learning goals, and ensuring equity of access across grade levels, actions that reflect a maturing approach to

educational technology beyond the reactive measures taken during the pandemic (Donham et al., 2022; Pardo-Baldoví et al., 2023). The parallels in business leadership are clear: successful innovation stems from top-down support, shared vision, and investment in people.

Theme 8: Evaluation and Selection of Tools

While mentioned by fewer participants, the process of selecting and evaluating tools was treated with intention. Leaders discussed pilot programs, vendor meetings, and soliciting teacher input to ensure the tools matched instructional goals.

One participant explained, “We don’t just pick the newest shiny thing…we often do a pilot or dry run with a small group first” (P4). Another added, “We allow teachers to try tools out before we commit” (P5).

Connecting to Evaluation and Selection of Tools to Literature

This intentionalism aligns with TIM’s authentic dimension, as tool selection was guided by real classroom needs rather than trend-following. It also resonates with the importance of participatory design and contextual fit when adopting educational technology (Anstey & Watson, 2018; Mahtani et al., 2022). From a business standpoint, this theme illustrates strategic procurement and user-centered design, both essential for technology adoption and return on investment.

Together, these eight themes paint a comprehensive picture of how school leaders are navigating the opportunities and challenges of classroom technology integration. They underscore that success lies not only in access to tools but also in the systems, mindsets, and leadership practices that support sustained, meaningful use.

Connecting to the Conceptual Framework

The Technology Integration Matrix (TIM) served as a helpful guide for understanding how school leaders support technology use across five core dimensions: active, collaborative, constructive, authentic, and goal-directed learning. Each of the key themes that surfaced in this project connects closely with one or more of these characteristics, showing how leadership choices play out in real classroom settings.

The Technology Integration Matrix (TIM) provided a helpful way to understand how school leaders shape the use of technology in classrooms. Its five dimensions, active, collaborative, constructive, authentic, and goal-directed learning, highlight how leadership decisions influence everyday teaching. One of the most consistent themes that emerged from the interviews was the value of professional development. Leaders emphasized the need for training that meets teachers at different levels and includes ongoing support throughout the school year. This type of embedded coaching has been shown to help teachers build both confidence and skill in using digital tools (Liao et al., 2021). But professional development alone is not enough. Teachers are more likely to succeed with technology when they feel supported not only through training but also with the right infrastructure and leadership encouragement (Baroudi & Shaya, 2022; Zengin, 2023). As schools continue adapting to new digital demands, flexible and responsive systems are essential for long-term success (Rath et al., 2021). When schools prioritize meaningful learning opportunities for teachers, they create a shared culture where technology supports, not replaces, good teaching (Welsh, 2011). The shared understanding aligns with research emphasizing the value of professional development

that is sustained and tailored to the needs of teachers (Darling-Hammond et al., 2020). As one leader said, “We offered sessions at beginner, intermediate, and advanced levels” (P4). Another noted, “Professional development is the cornerstone, we have ongoing coaching cycles” (P5).

Student engagement was also often discussed. Leaders mentioned that tools like Seesaw and Padlet helped students, especially those who don’t usually speak up, share their thinking in new ways. These examples reflect TIM’s focus on active and authentic learning, and they echo research showing that when students have more agency, their learning becomes deeper and more personal (Al-Harbi, 2014). “Seesaw helped even our shy students find their voice” (P2) one participant shared. Another said, “When they record their learning on Padlet, they reflect more deeply” (P3).

At the same time, leaders acknowledged that not every teacher embraces new tools right away. Pockets of resistance still exist, often tied to post-COVID fatigue or differences in comfort with digital tools. Leaders spoke about the importance of showing teachers early wins and taking things slowly. These comments support the idea that emotional and cultural readiness is just as important as access to tools (Welsh et al., 2011). “There’s still hesitation with our older teachers” (P1), one leader observed. Another added, “Some teachers need to see small wins before they believe tech is worth it” (P5).

One school leader noted, “There’s still hesitation with our older teachers” (P1), while another added, “Some teachers need to see small wins before they believe tech is worth it” (P5). These insights reflect the reality that not all educators adopt technology at

the same pace. Research shows that veteran teachers or those with more years in traditional classrooms often report lower self-efficacy when it comes to digital tools, which can impact their willingness to try new methods (Baroudi & Shaya, 2022). Studies also highlight the importance of creating early success experiences; small but manageable wins that help teachers build confidence and see the instructional value of technology (Liao et al., 2021; Rath et al., 2021). In schools where tech integration efforts are successful, leaders often provide patient guidance, tailored coaching based on the literacy level of technology among teachers, and a culture that allows room for gradual growth rather than immediate mastery (Zengin, 2023). When teachers feel supported rather than pressured, they are more open to exploring new tools and approaches that align with their teaching style. Veteran teachers find transitioning challenging, and leadership should be able to improvise in phases their process of transitioning into technology to have an effective outcome.

Equity was another priority. Leaders described efforts to ensure every student had a working device and internet access at home. But they also spoke about how equity goes beyond just hardware—it is about supporting families and assuring that learning stays on track for all students. These efforts reflect the collaborative and authentic aspects of TIM and connect with more recent conversations around bridging the digital divide in meaningful ways (Leithwood et al., 2023). “We checked every student had a Chromebook and Wi-Fi” (P3), one participant said. “We provide loaners and hotspots. Equity doesn’t stop at device access” (P5), another added.

Tools like Google Classroom and Canvas played a big role in helping students and teachers stay connected and organized. These learning management systems (LMS) supported collaboration and helped align daily work with broader instructional goals. “Google Classroom helped our students work in real-time with classmates” (P2), one leader explained. Another shared, “We standardized on Canvas so everyone had one place for work, messages, and deadlines” (P5). These platforms offered consistency, which many participants said was crucial, especially during remote or hybrid learning periods.

Leaders also spoke about managing distractions and setting boundaries in regards to digital use. Several schools have developed digital citizenship programs and policies that focus on helping students use technology in smart and respectful ways. These programs and policies reflect TIM’s goal-directed dimension and speaks to the growing need to teach students how to navigate the digital world responsibly (Ribble & Miller, 2013). One leader shared, “We block YouTube and games during school hours, it helps them focus” (P3). Another added, “Tech discipline is part of our digital citizenship program” (P5).

Leadership itself was a key part of the conversation. When school leaders actively model the use of digital tools and show a willingness to learn alongside their staff, they send a powerful message. Several participants noted that change happens faster when teachers see their leaders engaging with the same tools and challenges. This kind of modeling aligns with TIM’s constructive dimension and matches shared leadership (Leithwood et al., 2023). “Staff followed when they saw I was learning the tools myself”

(P1), said one principal. “Leadership is about modeling curiosity—we learn alongside our staff” (P5), added another.

Finally, thoughtful selection of tools came up across all interviews. Leaders talked about running pilot programs, gathering teacher feedback, and being cautious not to adopt technology just for the sake of it. These actions reflect the constructive and authentic elements of TIM, ensuring that any tool adopted truly supports learning goals. “We don’t roll out a tool without teacher input and pilot testing” (P2), one participant explained. Another said, “Always ask feedback…from teachers and students before deploying” (P5).

Altogether, these insights show how school leaders are making thoughtful, people-centered decisions about how to bring technology into their schools, not only to keep up with trends but also to support students, empower teachers, and build stronger learning communities.

Disputes and Areas of Exploration

The project, while offering valuable insight into the strategies school leaders use to support technology integration in non-public K–12 schools, is not without limitations. One of the primary limitations is the narrow participant group, all five interviews were conducted with school leaders. While their perspectives are essential, the absence of teacher and student voices limits the scope of understanding how these strategies are received and implemented in daily classroom practice. Including the perspectives of teachers and students would provide a more complete picture, especially since studies have emphasized the importance of student agency and digital personalization in post-pandemic classrooms (Christopher et al., 2023). Expanding this project to explore

teachers' and students' experiences with technology would offer a more comprehensive understanding of how technology can be effectively used to enhance classroom learning.

While this project applied a qualitative approach rooted in thematic analysis, the small sample size limits generalizability. The findings reflect trends and experiences specific to five non-public schools in Maryland. Schools are incorporating professional development practices and technology use rapidly in response to the change of school environment. In light of the changes that is taking place and the strategies captured here are insightful, they may not reflect the diversity of approaches being adopted in other regions or educational contexts.

Another limitation is the evolving nature of teacher attitudes toward technology following the COVID-19 pandemic. Several participants spoke about teacher resistance or burnout, yet this project could not fully explore the emotional and systemic factors behind that resistance. Pandemic-induced fatigue and lack of support have been shown to significantly influence post-pandemic tech adoption (Zhang & Trust, 2021), a dynamic that may warrant deeper investigation beyond leadership impressions.

The findings are also context-dependent. Many schools are still refining their use of LMS tools and digital collaboration platforms (Mukherjee et al., 2022). Because the landscape of educational technology continues to shift, some of the practices described may become outdated or require adaptation as new tools, policies, and pedagogies emerge.

Lastly, this project focused on the leadership perspective in the selection and evaluation of technology tools. While participants described thoughtful processes, the

absence of teacher and student input means the research may not fully reflect how tools are experienced in practice. Participatory design and user-centered evaluation are key to successful educational technology integration (Ko & Ross, 2021), and future studies could explore how these perspectives shape adoption outcomes.

Despite these limitations, the project lays an important foundation and opens the door for broader research that captures a fuller range of voices, experiences, and organizational contexts.

Business Contributions and Recommendations for Professional Practice

This project brings a fresh voice to the conversation around educational leadership, offering insight into how school leaders in non-public K–12 settings are navigating the challenges of technology integration. While much of the existing research focuses on teachers or public schools, this research shifts the spotlight to leadership, showing what happens when principals, directors, and instructional leads take the initiative to drive meaningful change. Leaders in this project did not just adopt technology for the sake of it; they made thoughtful decisions that considered the people involved, the systems in place, and the long-term vision for student learning (Leithwood et al., 2023).

One of the project's unique contributions is its use of the Technology Integration Matrix (Welsh et al., 2011) not only as a framework but also as a real working tool. Leaders used TIM to guide conversations with staff, reflect on current practices, and make strategic plans for what is next. This practical use of the TIM framework gives

school leaders, and even those in other sector, a roadmap for leading tech integration in a structured but flexible way.

The project also captures something less often talked about: the human side of leadership during digital transformation. The project highlights the importance of building trust, listening to teachers, and recognizing that change takes time. In this way, the findings speak not only to educators but also to leaders in other industries facing similar questions around innovation, resistance, and culture change. The strategies shared here, like modeling, coaching, and inclusive decision-making, can easily apply to businesses looking to support their teams through tech-driven transitions (Darling-Hammond et al., 2020).

By focusing on leadership, this research fills a much-needed gap. It offers practical, grounded strategies that can help current and future school leaders, and organizational leaders more broadly, lead with purpose, clarity, and care as they shape learning environments that meet the demands of a digital age.

The findings from this project offer several practical takeaways that school leaders can apply right away to strengthen how technology is used in classrooms. One of the clearest needs is for ongoing, differentiated professional development. Teachers come with different levels of comfort and experience with digital tools, and training needs to reflect that. Professional learning is most effective when it’s continuous, tailored, and grounded in real classroom practice (Darling-Hammond et al., 2020).

Leaders can also help create a school culture where trying new tools is not just allowed but encouraged. When teachers feel safe to explore and share what works, they

are more likely to find meaningful ways to integrate technology into their lessons. Using the Technology Integration Matrix (Welsh et al., 2011) as a shared roadmap can help guide those efforts, providing structure without being rigid.

Another important theme that came up in the project was the need to support students in using technology responsibly. Digital citizenship programs are not just about setting rules; they are about helping students make smart and ethical choices in online spaces, which is critical in today's classrooms (Ribble & Miller, 2013). Finally, leaders should involve teachers when choosing new digital tools. Getting their feedback and running pilot tests before full adoption does not just make for better decisions; it builds trust and shared ownership. Shared leadership plays a big role in the success of school-wide changes (Leithwood et al., 2023).

By taking these actions, school leaders can build thoughtful systems that support innovation, meet teachers where they are, and help students grow as responsible, engaged learners.

Implication for Social Change

The implications for positive social change include the potential to strengthen not only schools but also entire communities. When K–12 school leaders take deliberate steps to integrate technology in ways that are thoughtful, inclusive, and grounded in real classroom needs, they create learning environments that empower both teachers and students. This foundation does not stop at improved classroom instruction; it helps students develop the skills, mindset, and confidence to solve real-world problems creatively and ethically. As students grow into adults who are comfortable navigating

change, collaborating across differences, and thinking critically with digital tools, they become assets to their families, neighborhoods, and workplaces.

These shifts benefit more than individual schools; they ripple into the community at large. Local businesses gain future employees who are better prepared for a technology-driven workforce. Families feel more connected to their children's learning, especially when tools are used to improve communication and transparency. And communities see a new generation of leaders who are equipped to take on challenges with innovative solutions—solutions that reflect the values of equity, responsibility, and resilience. By building strong digital foundations in schools today, educational leaders are helping shape a more capable, inclusive, and forward-thinking society tomorrow.

Recommendations for Further Research

As this project explored how school leaders support technology use in classrooms, it also highlighted areas where more research is needed. These suggestions are not only for academics; they are meant to help school leaders and communities respond to the growing academic and digital needs of today's K–12 students. By building on what we have learned here, future research can offer deeper insight into what works, for whom, and in what settings.

Broaden the Sample Beyond Nonpublic Schools

This project focused on non-public K–12 institutions in the state of Maryland. Future research should explore whether similar strategies and challenges exist in public schools, charter schools, or schools in different geographic or socio-economic contexts.

Include Teacher and Student Perspectives

While this project focused on school leaders, integrating the voices of teachers and students would offer a more comprehensive view of technology integration. A multi-stakeholder approach could reveal additional barriers or facilitators that are not visible from a leadership perspective alone.

Longitudinal Studies on Sustainability

Future research could examine how leadership strategies evolve over time and whether initial integration efforts are sustained. Longitudinal data would help identify factors that contribute to lasting transformation rather than short-term implementation.

Impact of AI and Emerging Technologies

As generative AI tools continue to emerge in K–12 education, further research is needed to understand their pedagogical implications, ethical considerations, and how school leaders are preparing teachers and students for the responsible use of these tools.

Quantitative Studies Measuring Student Outcomes

To strengthen the causal link between leadership strategies and student learning, future studies could incorporate mixed-methods or quantitative designs that analyze test scores, digital literacy metrics, or attendance patterns in relation to tech integration initiatives.

Conclusion

This project examined the strategies employed by K–12 school leaders to effectively enhance technology integration within the classroom, thereby improving student learning outcomes. Using a qualitative methodology and guided by the

Technology Integration Matrix (TIM) framework, the research drew on rich insights from school leaders across multiple interviews. The project's findings offer practical guidance, theoretical contributions, and implications for ongoing innovation in educational leadership. The project bridges theory and practice through the lens of the TIM framework, amplifying the role of school leaders as drivers of meaningful, equity-focused technology integration. The insights derived can inform leadership preparation programs, policy discussions, and school improvement plans centered on digital transformation.

The research uncovered eight major themes that reflect how nuanced and strategic technology integration in K–12 education can be. First, professional development emerged as a foundational element; leaders described it as an ongoing, differentiated process tailored to support teachers at varying levels of comfort and experience. Student engagement was another recurring focus; many saw it not only as a benefit of using technology but also as a driving force behind its adoption. The issue of teacher buy-in and resistance stood out, as well, emphasizing the importance of addressing both internal hesitations and external challenges. Digital equity was a key concern, reminding leaders that access must go beyond simply providing devices; it also involves internet access, tech support, and inclusive planning. School-wide adoption of learning management systems and collaboration tools highlighted the need for structured digital environments that support communication and consistency. At the same time, leaders shared concerns around content filtering and student discipline, pointing to the growing importance of ethical and focused tech use in schools. Leadership itself played a central role,

particularly in how principals and administrators modeled digital practices and invested in long-term infrastructure. Finally, the process of evaluating and selecting educational tools was described as thoughtful and collaborative, often involving pilot testing and staff input. Together, these themes offer a layered understanding of how K–12 leaders approach the complex work of technology integration with purpose, care, and strategy.

These findings align with the TIM framework's emphasis on active, collaborative, constructive, authentic, and goal-directed learning environments. School leaders who integrate these elements create more equitable and effective classrooms.

Technology in education is not a destination but a dynamic journey. School leaders play a pivotal role in shaping this journey. The most successful strategies are not about adopting the latest tools but about creating a culture where technology supports instruction, engages students, and prepares them for the future. This project reaffirms that with the right leadership practices in place, schools can transition from digital adoption to digital transformation.

Future research and policy should continue to support leadership training, teacher empowerment, and the sustainable, ethical use of technology in classrooms. As technology evolves, so too must the vision and practices of those entrusted with leading our schools.

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Appendix A: Interview Questions

Initial Probe Questions

1. What is your role at the school?
2. How long have you been working in the school leadership team?
3. In what capacity do you see yourself contributing to the leadership team?
4. What is your educational and professional background?
5. What is your interest in technology?
6. Why do you think technology is important today?

Targeted Interview Questions

1. What is the reason your school implemented technological solutions?
2. How do you find resources to support the tools you use in the classrooms?
3. Based on your experience, what are the advantages and disadvantages of using technological tools to deliver classroom instructions?
4. In what ways did you get training to use these tools that your school implemented?
5. Where did you find the technology-driven tools needed for your class?
6. How has this improved students' engagement in your class?

Targeted Follow-up Questions

1. Where is the school going with utilizing technological solutions?
2. How will this help shape the students through their academic needs?
3. What should the school leadership team consider when using technology to transform the classroom?

4. How can the school or IT help teachers achieve the most when using technology?

Targeted Wrap-up Questions

1. What else would you like to share about the most effective and efficient classroom technologies that you've found to improve academic performance and the learning process?
2. What summative recommendations would you like to provide for the leaders responsible for selecting and deploying new classroom technologies for your school?

Appendix B: Themes Summary Matrix

Theme	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5
Professional development and training	One-on-one coaching	Session-based PD			Tiered PD levels
Student engagement	Student voice with tech tools	Padlet reflections			Deep student reflection
Teacher resistance and buy-in	Older teacher hesitation				Small wins build trust
Digital equity and access	Chromebooks distributed		Hotspot loans		Equity beyond devices
Learning management system (LMS)	Google Classroom used	Google Classroom backbone			Canvas standardization
Content filtering and digital discipline	Focus on learning tools only		YouTube blocked		Digital citizenship taught
Leadership modeling and vision	Leader used tools visibly			Leader as learner	Modeling curiosity
Evaluation and selection of tools	Staff feedback on tools	Teacher input required			Teacher/student feedback
Balanced technology integration					Healthy tech balance