Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 9, 1254-1267
2025
Publisher: Learning Gate
DOI: 10.55214/2576-8484.v9i9.10126
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Challenges, benefits, and ethical concerns of technology integration in teaching and learning: Perspectives from private and international school teachers

Mallika Vasugi V. Govindarajoo[1], Subadrah Madhawa Nair[2*], Tan Jun You[3], Cha Shi Ping[4], Chan Jia Min[5], Kelvin Wee Kai Wee[6], Hwong Chee Ying[7]
[1,2,3,4,6,7]Faculty of Education and Humanities, UNITAR International University, Kelana Jaya, Selangor, Malaysia; mallika@unitar.my (M.V.V.G.) subadrahmadhawanair@gmail.com (S.M.N.) android.junyou@gmail.com (T.J.Y.) joceedu0789@gmail.com (C.S.P.) jasmine.cjm@gmail.com (C.J.M.) kelvin680135@gmail.com (K.W.K.W.) hwong0929@gmail.com (H.C.Y.).

Abstract: The integration of technology in education has transformed teaching and learning by enhancing engagement, accessibility, and efficiency. However, despite its benefits, challenges such as technological barriers, digital inequality, insufficient teacher training, and ethical concerns continue to hinder effective adoption. This qualitative study explores the benefits, challenges, and ethical considerations of technology integration in private and international schools in Johor Bahru. Using a qualitative approach, semi-structured interviews were conducted with ten teachers to gain in-depth insights into their experiences with technology in the classroom. Findings reveal that teachers perceive technology as a valuable tool for improving teaching efficiency, student engagement, and administrative management. However, limited infrastructure, work-life balance concerns, and lack of information and communication technology (ICT) training remain significant barriers. Ethical concerns such as privacy risks, unequal access, plagiarism, and online misconduct further complicate technology adoption. The study underscores the need for enhanced teacher training, institutional support, and clear policies to address these challenges. Recommendations include improving technical infrastructure, implementing ethical guidelines, balancing digital and traditional teaching methods, and ensuring better work-life balance for educators.

Keywords: *Digital equity, Education policy, Ethical concerns, Inclusive education, Teacher training, Technology integration.*

1. Introduction

Technology integration has transformed education, enhancing accessibility, personalisation, and engagement [1]. Tools such as artificial intelligence (AI), learning management system (LMS), online resources, and data analytics support personalised learning and efficiency but also raise ethical concerns.Ethical issues in educational technology revolve around fairness, transparency, accountability, and human rights [2]. Key concerns include data privacy, student surveillance, algorithmic bias, and the digital divide, which disproportionately impacts underprivileged communities [3]. AI-driven assessments, the commercialisation of education by EdTech companies, and the diminishing role of traditional teaching further complicate these challenges. However a study by Al-Huwail, et al. [4] among 310 students in Kuwait indicates that students have positive views on the use of AI. Findings by Hashim, et al. [5] show that teachers are not equipped with sufficient knowledge on the use of AI.

This study explores how educators benefit from technology, navigate challenges, and manage ethical dilemmas while balancing innovation with responsibility [6]. By addressing data security, equity, and human oversight, it provides insights into ethical concerns and responsible technology use

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History: Received: 23 July 2025; Revised: 7 August 2025; Accepted: 11 August 2025; Published: 22 September 2025
* Correspondence: subadrahmadhawanair@gmail.com

in education [7]. Using a qualitative approach, the study examines the experiences of ten teachers from private and international schools in Johor Bahru, Malaysia, offering recommendations for ethical and equitable technology adoption.

1.1. Problem Statement

The integration of technology in teaching and learning has transformed educational environments, offering new opportunities for enhanced engagement, accessibility, and personalised learning. A study by Nair and Wider [8] revealed that students are comfortable with a wide range of digital tools and platforms, and they tend to be quick learners when it comes to new technologies. However, despite its potential, technology adoption in education presents significant challenges and ethical concerns that need to be addressed.

While digital tools can improve student outcomes, promote interactive learning, and support inclusion, many educators and institutions face barriers such as lack of training, digital inequality, and resistance to change [9-11]. Additionally, concerns about data privacy, student autonomy, and the ethical implications of AI-driven learning systems raise questions about the responsible use of technology in education.

The objectives of this study are to explore the benefits, challenges, and ethical considerations associated with technology integration in education. By investigating these aspects, the research seeks to provide insights into how digital tools can be effectively and ethically leveraged to improve teaching and learning experiences while addressing potential risks.

1.2. Research Questions

Based on the objectives, this study addresses the following research questions:
RQ1: What technologies are used in your school's teaching and learning?
RQ2: What are the benefits of technology integration in teaching and learning?
RQ3: What are the challenges of technology integration in teaching and learning?
RQ4: What are the ethical concerns of using technology in teaching and learning?

2. Literature Review

This study is based on Mayer's multimedia theory. According to Mayer [12] multimedia learning occurs when a person is able to build a 'mental model' from words (for example, from text, speech and printed text) and images (illustrations, photos, animations and videos). Mayer [12] explains that information will be processed by students through two basic channels, namely 'verbal' and 'visual'.In addition, current study is also based on theory of artificial intelligence AI which asserts A1 as a rational agent to achieve the best results [13].

Technology integration transforms pedagogy, reshaping traditional teaching methods. Digital tools such as LMS, AI, and web resources enable personalised learning, improve accessibility, and enhance student engagement [14]. However, the rapid expansion of educational technology raises ethical concerns, particularly regarding data privacy, equity, and automated decision-making [15]. This literature review examines the ethical implications of technology in education, highlighting its benefits, challenges, and key ethical considerations.

2.1. Ethical Concerns in Integrating Technology into Teaching

Educational technologies collect vast amounts of student data, including personal details, learning behaviors, and performance metrics [16]. While personalised learning offers benefits, data storage, sharing, and security pose risks as breaches compromise student privacy [17]. Moreover, the commercialisation of educational tools has sparked concerns about student data being exploited for targeted advertising, often without explicit consent [15]. This raises debates over data ownership and control, highlighting the tension between students' roles as learners and data subjects.

AI algorithms in educational systems may unintentionally reinforce inequalities in student

Edelweiss Applied Science and Technology
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performance. Computerised evaluation systems, predictive analytics, and personalized learning platforms rely on algorithms [18] that can disadvantage students from underrepresented groups, causing unfair assessments and limiting opportunities [19].

2.2. Surveillance Technologies in Education

The increasing use of surveillance technologies in education, such as AI-powered proctoring services and learning analytics, sparks debates on academic freedom and privacy. While these tools are designed to prevent cheating in examinations and monitor student progress, they also contribute to mistrust and constant surveillance, which conflicts with ethical principles of respect and dignity [20]. Such measures impose rigid behavioral norms on students, reducing the joy of learning and stifling creativity.

While digital tools enhance learning, unequal access reinforces inequalities. Van Dijk [21] highlights that students from underprivileged families or rural communities often lack reliable internet access, digital devices, and essential digital literacy skills, placing them at a disadvantage compared to peers. This raises fairness and inclusivity concerns in tech-driven education.

As technology reshapes classroom management, online tools help track student attentiveness, attendance, and discipline. AI-driven systems like ClassDojo and GoGuardian offer real-time analytics on engagement and behavior [14]. While these tools enhance efficiency, they raise ethical concerns about student autonomy, privacy, and bias. AI-powered monitoring may unfairly flag underrepresented students, reinforcing bias [15]. Additionally, constant surveillance through classroom management software can erode trust, making students feel monitored rather than supported, stifling creativity and engagement [20].

2.3. Digital Teaching Materials and Benefits

Digital teaching materials like Open Educational Resources (OERs), e-textbooks, and AI-generated content expand instructional resources, improving accessibility and personalization. However, they raise ethical concerns regarding content bias, intellectual property rights, and reliability. AI-driven recommendation systems may favor established publishers, limiting diverse perspectives [1]. Additionally, algorithmically curated learning materials often lack thorough scholarly review, raising questions about their authenticity and academic rigor [22].

The democratisation of education expands educational opportunities for students from diverse backgrounds, regardless of geographic or temporal limitations [23]. For example, LMS such as Moodle and Canvas provide platforms for content delivery, discussion, and assessment in a customizable and convenient manner.

Technology integration enables customised learning systems that fit students' abilities and needs. AI-powered platforms, such as Khan Academy and Duolingo, identify learning gaps and provide tailored recommendations, enhancing engagement and student outcomes [22]. This allows students to learn at their own pace, fostering a more inclusive and effective learning experience.Video conferencing platforms (e.g., Microsoft Teams, Zoom) and collaboration software (e.g., Google Workspace) transform student-teacher interactions. These digital tools support real-time communication, group projects, and promote peer learning, building an online community for student collaboration [24].

2.4. Challenges of Online Learning

Online learning is often disrupted by poor internet, software bugs, and hardware lags. These interruptions frustrate students and educators, affecting delivery and support [25]. A lack of infrastructure in underserved areas worsens these struggles, thus making distance learning significantly less effective. Lack of face-to-face interactions, which can leave students feeling isolated and disconnected [24]. This absence of physical classrooms and unstructured social interactions may hinder the development of essential social skills and a sense of belonging, both of which are crucial for

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a holistic educational experience.

Successful online learning requires a high level of digital literacy from both students and educators. However, many teachers struggle to integrate technology into their teaching effectively [19]. As a result, the potential of technology to enhance learning remains underutilized. To address these challenges of technology integration, educators and policymakers must adopt ethical frameworks that emphasise transparency, accountability, and equity. Holmes, et al. [22] in their *Ethical Framework for AI in Education*, highlight human oversight, fairness, and inclusivity as key principles for designing and implementing educational technologies. Similarly, the *Data Ethics Framework* by Regan and Jesse [16] stresses student data consent, data minimization, and accountability in ensuring ethical data practices.

3. Research Methodology

3.1. Research Design

A qualitative approach was employed to explore teachers' experiences with technology integration. Face-to-face, semi-structured interviews provided in-depth insights while maintaining flexibility in responses. According to Creswell and Poth [26] qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. Qualitative research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data.

Purposive sampling was used to select ten teachers from private and international schools, with access to technological resources and innovative teaching practices. These schools provide advanced tools and professional development, making their experiences highly relevant. Purposive sampling or judgmental sampling relies on the researcher's judgment when identifying and selecting the individuals, cases, or events that can provide the best information to achieve the study's objectives [3].

3.2. Research Instruments

Semi-structured interviews were used as instruments to collect the data, followed by predefined questions, allowing participants to elaborate the details, and gain insights into a particular phenomenon. The core semi-structured interview questions are:

(a) What technologies are used in your school's teaching and learning?
(b) What benefits have you experienced from technology integration?
(c) What challenges do you face in using technology?
(d) What ethical concerns arise from technology use in education?

The semi-structured interviews were recorded and transcribed by the researchers and analyzed using emerging themes. This approach ensured comprehensive insights into the benefits, challenges, and ethical considerations of technology in education.

4. Findings

Semi-structured interviews with 10 teachers (T1–T10) explored their experiences with technology integration in the classroom. The analysis focused on four areas: technologies used, perceived benefits, challenges, and ethical concerns.

RQ1: What technologies are used in your school's teaching and learning?

The interviews revealed that teachers employed various digital tools to integrate technology into teaching practices. Commonly used platforms included WhatsApp, online conferencing tools, Telegram, email, Google Classroom, Google Drive, Google Forms, Google Sheets, Google Docs,

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Google Calendar, and other digital resources. These tools supported instruction, collaboration, and communication. Teachers shared their experiences with these technologies as follows:

Our school utilises Google Classroom as the main medium for teaching and learning, facilitating sharing lesson materials, assignments, and announcements. Compared to traditional methods, it significantly enhances efficiency. Previously, students submitted handwritten assignments, which required manual collection and grading. Now, with Google Classroom, students can submit their work digitally, and teachers provide feedback more quickly. Lesson management is handled via Google Classroom, while WhatsApp groups enable quick communication between teachers and students. Online conferencing tools support virtual discussions and lessons. I also teach my students how to use AI for editing. (T1)

We primarily use WhatsApp for communication with students and colleagues. For virtual lessons and discussions, Zoom and Google Meet enhance interactive engagement. Google Classroom and Google Drive are essential for sharing instructional materials and student assignments. (T2)

In our school, we frequently use Telegram, Google Meet, Google Forms, and email to support teaching and learning. Google Meet facilitates virtual classes, while Google Forms streamlines quizzes, surveys, and evaluations, making assessments more structured and efficient. Nowadays, we teach students how to use AI.(T3)

Teachers integrate ICT tools into instructional tasks, such as collecting student responses via Google Forms and organizing data using Google Sheets. WhatsApp ensures quick communication among teachers. (T4)

Teachers use school email, WhatsApp, and Telegram for important communications. Google Drive stores and shares lesson materials, while Google Forms collects student feedback after lessons or professional development sessions. (T5)

My school implements various digital tools to support teaching and learning. Telegram and WhatsApp facilitate lesson updates and task assignments, while the school management system tracks attendance, discipline records, and academic performance. (T6)

We communicate via email and messaging apps like WhatsApp. The school provides iPads and a strong wireless network, ensuring seamless technology integration. A student portal records attendance, examination marks, and co-curricular achievements. (T7)

Educational discussions and decision-making occur via WhatsApp, while event feedback is collected through Google Forms. Teachers also use WhatsApp and Gmail to discuss student behavior before engaging with parents. A shared folder centralizes lesson materials, student records, and administrative data. (T8)

Teachers and school leaders communicate via email. Google Sheets tracks real-time lesson plans and assignments, while Google Docs' comment function supports feedback and reminders. Google Drive serves as a repository for teaching resources. (T9)

Our principal leverages Google Drive, Google Spreadsheets, Google Docs, the school server, Google Calendar, Gmail, and WhatsApp to support teachers in lesson management, student record-keeping, resource sharing, and staff communication. These tools also facilitate attendance tracking. (T10)

The emerging themes from qualitative data highlighted that principals support teachers in technology integration by providing access to digital tools like Google Classroom, Google Drive, Google Forms, and Google Calendar for lesson planning, instructional management, and student assessments. Teachers depend on WhatsApp, Telegram, and email for communication. Some respondents use the school management system and server for handling student data, while online conferencing tools support virtual discussions and meetings. Two respondents use AI in their classroom instruction.

RQ2: What are the benefits of technology integration in teaching and learning?

Through interviews, teachers shared their views on the benefits of technology integration in

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their teaching practices. Eight teachers emphasized that digital tools and file-sharing systems enhanced lesson efficiency. Their perspectives are as follows:

Extremely useful. Cloud storage allows us to upload lesson materials and resources, making them easily accessible anytime, anywhere. The ability to retrieve teaching files on demand has greatly improved lesson preparation and delivery. Personally, I find cloud storage highly beneficial, as I enjoy using technology to enhance my teaching. (T1)

Very useful and convenient. It enhances lesson management efficiency. Teachers can collaborate on lesson planning, share instructional materials with colleagues, and complete documentation tasks more quickly.

Additionally, student performance and attendance can be monitored more effectively. The flexibility of accessing teaching resources beyond physical constraints allows me to manage my lessons efficiently. (T3)

Highly beneficial. Technology enables us to continue lesson preparation and teaching regardless of location. Information transfer is quick, ensuring that even in the absence of teachers or students, documents and resources remain accessible via ICT tools. A smartphone alone is sufficient to communicate and access materials through messaging apps like WhatsApp. This has significantly improved the efficiency of managing teaching-related information. (T4)

Technology greatly enhances teaching efficiency. I can retrieve the information I need effortlessly and manage my time more flexibly. Sometimes, I prepare lesson materials at home, other times at school. File transfers are no longer necessary, as everything is stored in Google Drive. This convenience allows me to access records and resources anytime. If I don't finish a lesson plan at school, I can continue working on it at home, ensuring deadlines are met efficiently. (T5)

Very helpful. ICT tools enable teachers to share lesson materials seamlessly. Additionally, student data, disciplinary records, and academic results can be accessed conveniently, enhancing the overall teaching and learning process. (T6)

"Teachers can access and respond to lesson-related information at their convenience. They can also exchange ideas and share teaching resources for lesson planning. If a teacher is absent, they still have access to important updates and instructional materials. (T7)

Very useful. Teachers can locate lesson resources and teaching documents through file-sharing platforms instead of searching for colleagues in person, saving time. Materials can be accessed quickly and efficiently, reducing unnecessary movement. Additionally, teachers can work from home effectively, ensuring continuity in lesson planning and instruction. (T8)

With Google Suite, we can track lesson progress in real-time, without location or time constraints. I can check and update files anytime, anywhere. (T10)

Teachers recognized that technology integration significantly improved efficiency, enabling convenient access to essential documents and resources. This facilitated real-time lesson monitoring, regardless of location. The rapid transfer of teaching materials boosted productivity, while collaboration was enhanced through shared access to instructional content. Additionally, important information could be disseminated efficiently, ensuring all teachers stayed updated—even in cases of absence or missed meetings.

Teachers highlighted that cloud storage and file-sharing systems allowed them to access, manage, and share documents efficiently, saving time and increasing flexibility in completing tasks.

Cloud storage capacity continues to expand, requiring active management to keep files organized. This is essential as we rely on it daily for document storage. (T1)

Some teachers also noted that technology improved collaboration by enabling seamless sharing of teaching materials and student records. They highlighted that digital tools facilitated more effective monitoring of students' progress and attendance.

We like it as it makes completed works more efficient. (T5)

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All teachers and staff are encouraged to engage in ICT integration, and we actively participate in it. (T6)

Additionally, mobile applications and online communication platforms allowed for faster information exchange, even outside school hours, ensuring that no teacher missed important updates. The ability to work remotely and access resources anytime, anywhere was seen as a major advantage, contributing to better time management and increased productivity.

Yes, we engage actively. All information is sent and shared among relevant staff, so we have to learn and master it. (T7)

Teachers are generally responsive to information shared and ask questions when needed. (T8)

Overall, teachers acknowledged that technology integration streamlined administrative tasks, improved efficiency, and provided better access to essential information, ultimately enhancing the teaching and learning experience.

Our principal emphasizes the use of technology, sending information via email and WhatsApp to track teaching progress and task completion. Teachers actively engage in this process, recognizing that digital adoption aligns with global educational trends. (T10)

RQ3: What are the challenges of technology integration in teaching and learning?

In the interviews, four teachers (T1, T2, T3, and T9) highlighted various technological challenges they encountered when integrating technology into teaching and learning. Their perceptions are as follows:

The main disadvantage of such applications is connectivity issues, especially for teachers without an active data connection. Slow internet remains the biggest challenge, despite having 4G. Cloud storage capacity increases over time, requiring active management. Schools should provide technical support to organize and clear unnecessary documents. Some records should be shifted to other storage to free up space for future use, as cloud storage is essential for daily document saving. (T1)

Internet speed is very slow in school, delaying urgent tasks. I often bring work home to use my own network. (T2)

Data connection is a challenge. Not all areas have high coverage. Some teachers struggle with internet access at home, making it difficult to respond immediately or complete work requiring the internet, such as Google Forms. (T3)

Without Wi-Fi, work is delayed due to weak connectivity. (T9)

Three teachers (T1, T3, and T8) expressed concerns about disseminating information among colleagues, while seven others believed their colleagues were actively engaged.

Older teachers need more time to understand technical aspects. Younger teachers vary—some explore tools independently, while others lack interest and refuse to learn. (T1)

Teachers are trying to learn it, even though it is new for them. (T2)

Our principal does not emphasize engagement. Some students mute notifications and ignore messages, making one-way communication less effective. (T3)

All parties engage actively with those technology related policies. (T4) We like it as it makes completed works more efficient. (T5)

Teachers and students are encouraged to integrate technology and remain active. (T6)

Yes, we engage actively. All information is sent and shared among relevant students, so we have to learn and master it. (T7)

Most students are responsive, but some don't check apps or emails regularly, missing important information. (T8)

All teachers engage in learning as each is provided an iPad. (T9)

The principal tracks teaching progress via email and WhatsApp. Teachers engage because they understand its importance in modern education. (T10)

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We need proper guidelines on how to use AI in the classroom (T3)

Five teachers (T3, T5, T6, T7, and T10) highlighted trust-related concerns, particularly regarding work-life balance. Cascio and Shurygailo [27]; Renneker and Derks [28] and Wright, et al. [29] emphasized that maintaining trust in e-communications involves protecting privacy at work and home to ensure a healthy work-life balance. Teachers' experiences in this area include:

No privacy. Students message at night with academic questions, taking away family time. This affects other teachers as well. (T3)

We must respond to students, parents, or the principal after office hours. The principal may send instructions late at night, but we must still reply. (T5)

Leaders often ignore teachers' rest time and contact them even when off duty, causing stress and disrupting family time. Leaders should address this issue. (T6)

At times, information was shared or required a response during off working hours. (T7)

Since information is accessible anytime, students and parents expect prompt replies. Determining response expectations during non-working hours is challenging. (T10)

According to Wright, et al. [30] effective e-communication should be clear, organized, and allow feedback to avoid misunderstandings. Additionally, communication should not become excessive, overwhelming recipients. Two teachers (T7 and T8) described their challenges with e-communication:

At times it limits the discussion as it's top-down information, and basically nothing could be changed as the information has been published or shared. At times, shared information was not validated and needed a prevailing amendment or correction which caused much confusion and inconvenience among students. (T7)

The disadvantage is that when messages get too many, people might miss out on certain messages. For interaction, I think words alone are not good enough to express much emotion, people may get the wrong impression. (T8)

Three teachers (T1, T2, and T9) stated that they had to explore ICT tools independently, which was time-consuming. Their perspectives include:

For those who are familiar with techs, they know how to explore on their own but for those who are not tech-savvy, the process of familiarization is the same with the older teachers. It depends on the individuals whether they have the interests to explore the tools. If the individuals are not tech-savvy and not interested in that, they will refuse to spend much time on that. Teachers also need proper training on the use of AI in the classroom.(T1)

Teachers are trying to learn it, even though it is new for them. However, it is time consuming. (T2)

We need to keep learning new apps and their features continuously, and keep doing research on new tools that work better continuously. I need to spend a lot of time on research. (T9)

The data collected highlights several challenges faced by teachers in integrating technology into teaching and learning. These challenges include technological constraints, team-building difficulties, trust and privacy concerns, e-communication issues, insufficient training, and the time-consuming nature of exploring digital tools. Teachers (T1 & T3) also raised their concerns on guidelines and training on the use of AI in teaching and learning. Addressing these challenges is essential for optimising technology use in education.

RQ4: What are the ethical concerns of using technology in teaching and learning?

Technology integration in education has brought significant advantages; however, ethical concerns remain a critical issue. According to Ramorola [6] ethical considerations in educational technology include data privacy, digital divide, cyberbullying, academic dishonesty, and fair access to learning opportunities. In this research, teacher interviews have been analyzed based on these categories.

First, the privacy and data security concerns. The protection of student and teacher data is a major concern in technology-driven education. Several teachers highlighted challenges related to privacy

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ISSN: 2576-8484
Vol. 9, No. 9: 1254-1267, 2025
DOI: 10.55214/2576-8484.v9i9.10126
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breaches and data security risks.

Some educational apps require students to sign in with personal information, raising concerns about data security and third-party access. (T1)

Cloud-based platforms store student records, but teachers have no control over security, increasing the risk of data leaks or hacking. (T3)

There should be more awareness among teachers and students on protecting personal data when using digital platforms. (T7)

Next, unequal access to technology creates a gap between students who have advanced digital tools and those who do not, affecting fairness in learning opportunities.

Some students do not have internet access or suitable devices, making it difficult for them to complete assignments and participate in online learning. (T2)

Technology is meant to enhance education, but students without access fall behind, leading to learning inequalities. (T5)

Even when students have devices, some parents cannot afford high-speed internet, limiting their children's full participation in digital learning. (T8)

The integration of technology in learning environments also exposes students to potential risks like cyberbullying and online harassment.

Some students misuse online platforms to spread harmful messages or harass classmates. (T4)

Students take screenshots or recordings during virtual classes and misuse them, violating privacy and leading to bullying. (T6)

Stricter policies and monitoring are needed to ensure responsible student behavior in digital learning spaces. (T9)

Academic dishonesty and plagiarism is another concern from the interviews. The easy availability of online resources has increased concerns over academic integrity. Teachers have expressed difficulties in ensuring originality in student work.

Students sometimes copy and paste assignments without proper citations, making it difficult to assess their true understanding. (T3)

Online exams and assessments are hard to monitor, increasing the risk of cheating. (T7)

Better plagiarism detection tools and clear guidelines are needed to ensure original student work. (T10)

Lastly, the extended use of digital tools in education has raised concerns about student well-being, particularly regarding screen time and mental health.

Students spend excessive time on screens, leading to eye strain, fatigue, and reduced physical activity. (T1)

Some students struggle to focus in long online sessions, getting distracted by other apps or websites. (T5)

A balance between digital and traditional learning is needed to prevent over-reliance on technology. (T9)

Based on the interview data, teachers highlighted five major ethical concerns in technology integration: privacy and data security, digital divide, cyberbullying, academic dishonesty, and excessive screen time. Addressing these issues is essential to ensure that technology enhances learning without compromising ethical standards. Schools should establish clear policies, provide teacher training, and promote responsible digital behavior among students.

The findings indicate that teachers recognize the benefits of technology integration in teaching and learning, including easy access to information, improved work performance, increased efficiency in management processes, and time-saving advantages. However, qualitative data also highlights several challenges, such as technological difficulties, teacher engagement issues, work-life balance concerns, management and communication challenges, insufficient training, and time-consuming processes.

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Additionally, teachers identified key ethical concerns, including privacy and data security, unequal access to technology, online misconduct, plagiarism, and health-related issues. Addressing these ethical and practical challenges is essential to ensuring that technology integration remains both effective and equitable. The findings also emphasize the need for ongoing support, comprehensive training, and well-defined policies to maximize the benefits of technology while mitigating its associated risks.

5. Discussion

5.1. The Technologies that are Integrated in School for Teaching and Learning

The qualitative data derived from interviews were systematically analyzed and categorized into themes based on the research questions. The findings revealed that teachers utilize various technological applications in their teaching and learning processes, including WhatsApp, Telegram, school email, custom-made school management systems, internal storage servers, Google Spreadsheet, Google Docs, Google Classroom, Google Drive, Google Forms, Google Calendar, video call applications, school websites, and school blogs.

These technological tools facilitate essential tasks such as online interaction, file sharing, lesson planning, and classroom management. This aligns with Hinds and Kiesler [31] concept, which highlights the role of computer-mediated communication in task-oriented decision-making and problem-solving among school leaders. Similarly, the findings support [32] who emphasized the significant impact of Google applications on educators' daily tasks. The effectiveness of WhatsApp in educational settings is also consistent with Cetinkaya [33] study, which highlighted its advantages, such as instant messaging, file-sharing capabilities, and overcoming spatial and temporal communication barriers.

Recent studies further corroborate these findings. For instance, Nazamud-din, et al. [34] conducted a descriptive analysis on the use of WhatsApp in Malaysian tertiary education and found that students had positive perceptions regarding its playfulness, usefulness, ease of use, and interaction aspects. Their study suggests that WhatsApp serves as a convenient tool for communication and collaboration between teachers and students, particularly during times of crisis such as the COVID-19 pandemic.

Additionally, Halim and Abd Halim [35] explored the effects of an online heutagogy approach in science learning via Telegram on students' science process skills and creative thinking abilities. Their study revealed significant improvements in these skills, highlighting the efficacy of the learner-centred approach in online learning environments.

These findings underscore the pivotal role that digital communication platforms like WhatsApp and Telegram play in facilitating effective teaching and learning processes. Beyond supporting administrative and instructional tasks, these tools enhance student engagement and skill development across various educational settings.

5.2. The Benefits of Using Technology in the Process of Teaching and Learning

The findings indicate that teachers benefited from technology in several key ways, including improved access to information, enhanced work performance, reduced workload, increased efficiency, and strengthened school communication. These advantages, in turn, motivated teachers to enhance their professional growth. These results align with Zain, et al. [36] who highlighted how School Management Information Systems enhance administrative efficiency. Similarly, Gurr [37] found that such systems streamline workload and improve management processes, while Blau and Presser [38] emphasized their role in facilitating teacher-student communication.

Moreover, this study supports the positive influence of e-leadership on teachers' performance, aligning with research by May [39], Borruso [40], Peterson [41], Inkster [42] and Arnold [43]. Wanjala [44] further emphasized technology's role in improving school administration, particularly in student data management and record-keeping. Recent studies further support

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DOI: 10.55214/2576-8484.v9i9.10126
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these findings. For instance, a 2023 article from eSchool News discusses how digital tools for lesson planning, grading, and communication allow teachers to manage their workload more efficiently, freeing up time for more focused instruction. Additionally, a study from Purdue University [45] highlights that technology supports and transforms education by making it easier for teachers to create instructional materials and enabling new ways for people to learn and collaborate. Findings by [8] also revealed that when the teacher uses smart phones in collaborative essay writings, students really had fun and enjoyed their writing activity.

In addition, the UNESCO [46] emphasizes that technology fosters flexible learning environments, collaborative learning among teachers, coaching and mentoring, reflective practice, and improved pedagogical knowledge. This underscores the role of technology in enhancing professional development and instructional effectiveness.

Furthermore, a study from the University of Connecticut notes that technology is constantly transforming education, with 76% of students stating that technology makes learning more engaging and 90% of teachers reporting that technology helps them assess student learning more effectively [46].

Collectively, these studies reinforce the positive influence of technology on teachers' performance, workload management, and professional growth, aligning with earlier research by May [39], Borruso [40], Peterson [41], Inkster [42] and Arnold [43]. Wanjala [44] further emphasized technology's role in improving school administration, particularly in student data management and record-keeping.

5.3. The Challenges of Using Technology in the Process of Teaching and Learning

The findings revealed several challenges faced by teachers, including technological difficulties, teacher engagement issues, work-life balance concerns, management and communication challenges, insufficient training, and time-consuming processes. Similarly, a study by Hakim [47] identified common obstacles such as limited access to modern technology, unreliable internet connections, and low motivation among learners, highlighting the need for ongoing professional development to address these issues. Similarly, research by Gurr [48] emphasized the importance of educational leaders developing strong e-communication skills and fostering a supportive social climate in technology-mediated environments. Additionally, a study by Brown and Green [49] highlighted that principals' technology leadership practices are crucial in facilitating the integration of information and communication technologies (ICT) into K-12 schools, thereby enhancing overall school effectiveness. These findings collectively reinforce the critical role of continuous professional development and strategic leadership in overcoming the challenges of technology integration in educational settings. The findings also indicate that some teachers use AI in their classrooms, and they require clear guidelines and training on the use of AI in schools [5].

5.4. The Ethical Concerns of Using Technology in Teaching and Learning

The study also revealed significant ethical concerns associated with technology use in education. First, data privacy and security**, t**eachers raised concerns about protecting students' personal information when using online platforms. The risk of data breaches and unauthorised access to sensitive information remains a major challenge. Second, digital equity, the study highlighted disparities in students' access to technology and the internet, which may create unequal learning opportunities. Third, online behavior and cyberbullying, **t**eachers observed that online communication could sometimes lead to misinterpretations or cyberbullying among students, affecting their well-being. Fourth, intellectual property issues, the ease of digital content sharing raises concerns about plagiarism and proper citation of sources. Last, over-reliance on technology can lead to excessive use of technology that may diminish critical thinking and interpersonal skills among students. As such, it is crucial to maintain a balance between digital and conventional teaching methods.

These concerns align with studies by Hertel, et al. [50], Snellman [51] and Malhotra, et al. [52] which emphasise the need to build a trusted digital environment that respects privacy and work-life

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 9: 1254-1267, 2025
DOI: 10.55214/2576-8484.v9i9.10126
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balance. Levin [53] explores management strategies to promote work-life balance in hybrid teams, suggesting that organizational culture and leadership efforts are crucial in establishing frameworks that support employees' well-being in digital work environments.

6. Conclusion

Technology adoption in private and international schools in Johor Bahru have substantially increased accessibility, personalization as well as efficiency through tools such as WhatsApp messenger and Google Classroom [31-33, 54]. Still, factors such as unreliable internet access, a shortage of devices and unwilling teacher training inhibited the impact [55] engagement difficulties and work-life imbalances pointed to the demand for institutional support [54]. As AI tools such as ChatGPT add additional ethical concerns to data privacy risks, education inequality and online misconduct cause an instant need for secure infrastructures and moral literacy programs [50-52, 54]. Solving them will require policies that harness innovation and accountability to protect student autonomy in creating authenticity.

The findings of this study suggest that, to enhance technology integration, schools should optimize their technology infrastructure, improve internet connectivity, and establish dedicated technical support teams. In addition, schools should develop policies that outline ethical technology use, communication protocols, and privacy protection measures. Administrators should set clear boundaries for after-hours communication to support teachers' well-being. Regular professional development sessions should be organized to equip teachers with the necessary ICT skills. Finally, schools should encourage a balanced blended learning of digital and conventional teaching methods to promote holistic learning.

To maximise efficiency, Ministry of Education should provide training, resources and guidelines for safe and welcoming learning environments. Future work should extend analyses for multiple school contexts, larger teacher samples and across education levels to increase our labelling of adoption barriers. Understanding the personal factors driving technology use could help tailor implementation strategies of new digital technologies. But in the end, it is essential to find a way to balance for equity and ethics, as well as adapt these trends, minimizing risks to privacy and in education. By addressing these areas, future studies can contribute to a more refined understanding of technology's role in education and improve its implementation for greater effectiveness.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 9: 1254-1267, 2025
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