

## Utilizing Mobile and Multimedia Technology to Enhance Online Learning Skills

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**Abstract**

**Introduction:** This article proposes utilizing mobile and multimedia technology to enhance online learning skills are to show the information of utilizing mobile technology for education, and to investigate the effect of integrating mobile and multimedia technology to improve online learning skills.

**Contribution:** The result showed that Mobile and multimedia technologies can effectively enhance students' online learning skills in the 21st century. They support the development of analytical thinking, critical thinking, creativity, communication, and lifelong learning. With the integration of modern technologies, learners gain greater opportunities to access educational resources anytime and anywhere through mobile and multimedia tools.

### 1. Introduction

Mobile and multimedia technologies are essential for improving students' online learning skills by providing interactive, engaging educational experiences. These technologies facilitate flexible learning environments, allowing students to access resources anytime and anywhere, especially enhancing their learning outcomes and engagement. The integration of these technologies contributes to diverse learning styles, also supports collaboration among students and teachers, leading to the overall educational experience (Pedraja-Rejas et al., 2024).

This integration is essential for creating an inclusive educational environment that accommodates various learning preferences and promotes active participation in the learning process. Furthermore, the use of mobile and multimedia technologies can significantly enhance student motivation and engagement, leading to improved academic performance and better retention of knowledge (Anuyahong & Pucharoen, 2023).

This transformative approach to education physically addresses the needs of modern learners as well as prepares them for a technology-driven future. As educational institutions increasingly adopt mobile and multimedia technologies, they can create more engaging and effective learning experiences that cater to the

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diverse needs of students. This shift towards technology-enhanced learning environments aligns with the growing recognition of mobile devices as pivotal tools in education, breaking down barriers to access and fostering interactive learning experiences. As mobile technology continues to evolve, it is crucial for educators to embrace these tools to enhance learning experiences and outcomes for all students. (Sun et al., 2021)

## 2. Problem Statement

In the new era, digital and online education has a role in enhancing education, especially online learning to advance 21<sup>st</sup> century learning skills. However, besides the rapid change teachers and students are struggling with the readiness in self-directed digital learning vibes which can impact effective learning outcome (Gaziyeva & Azadillayeva, 2024). Another challenge, when it comes to online learning, is the simple delivery of online content to actively cultivate the competencies, such as critical thinking, analytical reasoning, and self-regulation required leading the successful classroom. According to a case study in Lao PDR. Multimedia technology scenario in Lao PDR where teachers and students are still lack skill of technology and self-directed digital learning (GEM Report UNESCO, 2023a). A report by GEM Report UNESCO (2023b) mention that over the past decades, technology has advanced so quickly that it has inspired a growing interest in how it can improve teaching and learning. Although the research results vary, many people agree that technology can help overcome some of the toughest challenges in education. This is especially true for students who are often left behind those living in remote areas, experiencing poverty, or facing barriers related to disability, ethnicity, or gender. For these learners, technology can open doors to new learning experiences, especially when traditional classroom methods have not met their needs (Pedraja-Rejas et al., 2024).

This article aims to highlight the significance of mobile learning technologies in supporting higher order thinking skills, as indicated by their positive impact on student engagement and learning outcomes. By understanding these dynamics, educators can better implement strategies that leverage technology to enhance critical thinking and collaboration in online learning environments (Siminto, 2023). In addition, to address the challenges associated with multimedia technology integration, such as differing levels of student technological readiness and the need for ongoing teacher training to maximize its effectiveness. Moreover, effective integration of mobile technology not only boosts student engagement but also enhances critical thinking skills, as evidenced by various studies highlighting its positive effects on learning outcomes (Celeste & Osias, 2024).

## 3. Conceptual Framework

In conclusion, addressing these challenges is essential for optimizing the benefits of mobile technology in educational settings, ensuring that all students can engage meaningfully and think critically during their learning experiences. To achieve this, teachers must adopt innovative pedagogical strategies that influence mobile technology effectively while minimizing potential distractions and enhancing student engagement.



**Figure 1.** Conceptual Framework

**Note:** This image was generated by ChatGPT in response to the prompt 'Create an image and do not include any people in the image'.

#### 4. Online Learning Skills Development

Recently, online learning represents a vital shift in education, particularly in Indonesia, where improvements are needed to enhance learning effectiveness. By integrating practitioners' insights, existing public knowledge, and newly created knowledge, this model supports collaboration and shared intelligence (GEM Report UNESCO, 2023 a). The Networked Learning Communities program in the UK exemplifies how large-scale initiatives can facilitate better education policies and implementation. Ultimately, embracing networked learning principles can drive educational innovation, improve accessibility, and enhance knowledge-sharing among educators, institutions, and learners (Ashar et al., 2021). Moreover, the systematic review highlights the impact of online learning environments (OLE) in fostering transferable skills, with 72% of studies reporting improvement in critical thinking and 65% in enhanced communication skills. While OLE has proven beneficial, gaps remain in the development of creativity, problem-solving, and social skills. Research mainly focuses on higher education with 81%, and limited exploration in primary and secondary levels only 19%, with an over-reliance on quantitative methods. Challenges such as communication difficulties with 49% and 38% indicating adjustment issues among learners. Moreover, a more comprehensive and inclusive approach is needed to maximize OLE's potential in education (Weng et al., 2024). Nevertheless, Online learning plays a crucial role in preventing violence by providing accessible education and fostering essential skills. It offers courses on conflict resolution, emotional intelligence, and communication techniques, helping students learn how to manage disagreements peacefully. A study by Kopelovich et al. (2023) state that the evaluated an online distance-learning (ODL) course for frontline providers and trainees on violence risk assessment. Knowledge quiz scores increased significantly from pre-posttest for each module showed: confidentially pretest mean 1.33 and posttest 1.60; duty to warn pretest 1.56; posttest 1.78; risk assessment pretest 1.41; posttest 1.78; combined total pretest 4.29 and posttest 5.17; all change  $p < .001$ . This suggests that online learning can effectively improve knowledge,

self-perceived competence, and the ability to apply violence –risk assessment skills. Digital platforms enable global discussions, allowing people to understand different perspectives and reduce prejudices that often contribute to violence. Additionally, online learning provides a safe space for victims to seek support, access resources, and build resilience without fear of judgment or retaliation. By promoting awareness and critical thinking, online education empowers individuals, especially young learners, to make informed decisions, stand against violence, and contribute to a more respectful and inclusive society (Saengloetuthai, 2022). Online lifelong learning is a powerful tool for skill development, workforce adaptation, and economic growth. It helps individuals continuously upskill and reskill, ensuring they remain competitive in rapidly evolving industries. In Thailand, where technological advancement is a key driver of economic and social development, integrating online education into national strategies allows workers to stay informed and proficient. The flexibility of online learning enables individuals to acquire in-demand skills at their own pace, addressing the labor shortage issue and bridging the gap between supply and demand. Furthermore, lifelong learning fosters adaptability, helping workers adjust to new environments and technologies efficiently. Organizations benefit from a workforce that continuously improves, contributing to sustained economic progress. By embracing digital education platforms, workers can access specialized courses that enhance their expertise and ensure they utilize their full potential, ultimately driving both personal and organizational success (Sudsaward & Sapphayalak, 2021).

## 5. Utilizing Mobile Technology for Education

Mobile technology has fundamentally transformed the educational domain by significantly improving accessibility, engagement, and individualized learning experiences. It facilitates remote and cost-effective educational opportunities through the utilization of digital libraries, electronic books, and educational applications such as Khan Academy and Duolingo, rendering the learning process interactive through the incorporation of gamification, augmented reality/virtual reality, and video-based instructional content (Sanda & Klimova, 2021). Meanwhile, in Thailand, Surindra Rajabhat University has also developed a metaverse system to promote learning at the Textile Museum, Office of Arts and Culture, utilizing modern technology that allows users to access it via mobile phones (Surindra Rajabhat University, 2023). Moreover, applications powered by artificial intelligence provide personalized learning experiences, while communication platforms such as Google Classroom and Zoom promote collaborative interactions between educators and learners, enable real-time evaluations, and offer immediate feedback (Kimmons et al., 2025). Mobile devices further enhance educational experiences for individuals with special needs by employing assistive technologies, including text-to-speech and speech recognition systems. Moreover, they contribute to cost reduction by decreasing dependence on traditional physical infrastructure and fostering lifelong educational pursuits through platforms like ELSA and AI power. (Khalizah & Damanik, 2024). Nevertheless, obstacles such as the digital divide, potential distractions, and concerns regarding data privacy persist. In spite of these challenges, mobile technology has effectively democratized education, rendering it more adaptable, inclusive, and accessible on a global scale (Navas-Bonilla et al., 2025).

Mobile applications have revolutionized the educational landscape by rendering the learning process more accessible, interactive, and tailored to individual needs (Chambers, 2020). They empower learners to access instructional materials at any time and from any location effectively removing geographical constraints while gamified educational applications (such as Duolingo and Kahoot!) enhance learner engagement through the incorporation of quizzes and incentives. Artificial intelligence–driven applications (including Khan Academy and BYJU’S) adjust to the unique learning velocities of students, thereby offering personalized lessons and immediate feedback. Educators gain advantages from classroom management applications (such as Google Classroom, Zoom, and Remind), which facilitate the organization of assignments, grading processes, and communication. Furthermore, augmented reality and virtual reality applications (like Google Expeditions) foster immersive educational experiences, while electronic book and audiobook applications (such as Kindle and Audible) render studying more adaptable (Sanda & Klimova, 2021). For the purpose of skill acquisition, platforms which provide professional development courses that can be accessed via mobile devices. Notwithstanding challenges such as the digital divide and distractions posed by screens, mobile applications significantly enhance educational experiences by making them more engaging, efficient, and inclusive (Anuyahong & Pucharoen, 2023).

## 6. Development Multimedia Technology for Enhancing Learning Skill

The integration of multimedia technology in education considerably enhances learning skills and encourages student’s learning style. This approach captures students' attention facilitates a deeper understanding of complex concepts through varied media formats. A 2023 study highlights the role of multimedia (text, video, images, audio, interactive content) in creating immersive learning experiences that cater to different learning preferences. The findings highlight improved engagement, retention, and adaptability in student learning environments (Rahman & Mehnaz, 2024). Moreover, the use of multimedia resources can effectively stimulate students' interest and promote their autonomous learning, ultimately leading to improved educational outcomes (Yan & Lowell, 2025). This transformation in educational practices show the importance of adapting teaching methodologies to leverage technological advancements for better student engagement and learning efficiency (Godsk & Møller, 2025). The effective use of multimedia technology can bridge the gap between traditional teaching methods and modern educational needs, enhancing both engagement and knowledge retention. Furthermore, integrating multimedia technology into language learning can simulate real–world environments, thereby improving students' oral and intercultural communication skills. A 2024 paper discusses how digital tools individualize learning, enhance motivation, and improve access to authentic materials. It show the benefits of interactive platforms and immersive technologies in language education (Gaziyeva & Azadillayeva, 2024). This approach not only enhances learning interest but also promotes knowledge involvement, to lead the better educational outcomes. However, challenges such as access to technical equipment and varying levels of teacher proficiency in technology must be addressed to ensure the successful implementation of multimedia–based learning. Addressing these challenges requires targeted professional development for teachers and investment

in necessary technological infrastructure to support effective multimedia integration in classrooms. Eventually, overcoming these barriers will enable a more effective and equitable multimedia learning environment that benefits all students (Chen, 2025). This framework should focus on best practices and evidence-based strategies to ensure that multimedia technology is used effectively in diverse educational settings. This structured approach will not only facilitate the integration of multimedia technology but also ensure that it meets the diverse needs of students in various learning contexts (Kaya & Adiguzel, 2021). More recent studies propose frameworks combining interactive multimedia with feedback and reflection loops. For example, the FRaME model (Framework for the Rational Analysis of Mobile Education) uses multimedia case studies, guided reflection, and performance data to coach teachers, especially novices to implement evidence-based classroom strategies efficiently (Mayer, 2021). Incorporating a systematic framework for multimedia integration can greatly improve the quality of learning experiences, making education more inclusive and effective for all students (Pannullo et al., 2025) This structured framework should also incorporate ongoing assessment and feedback mechanisms to continuously refine multimedia integration strategies based on student performance and engagement. Additionally, supporting collaboration among teachers to share successful multimedia integration practices can further enhance the effectiveness of these strategies in diverse learning environments (Barth & Ciobanu, 2021). This collaborative effort can lead to the development of innovative approaches that address the diverse learning needs of students, lead to support a more inclusive educational landscape. Incorporating a collaborative framework can impact teachers to share knowledges and strategies, to ensure that multimedia technology effectively addresses diverse student needs and enhances overall learning experiences.

## 7. Effect of Integrated Mobile and Multimedia Technology to Enhance Online Learning Skills

The integration of mobile and multimedia technology in online learning certainly can enhance students' skills by providing interactive and personalized learning experiences that provide to individual needs. This personalized approach support engagement and motivation, allowing students to learn at their own schedule and develop essential skills for lifelong learning. A case study demonstrated that mobile devices significantly boost students' motivation and engagement. By integrating mobile tools in management accounting courses, students interacted dynamically with business communities, promoting essential lifelong learning and social skills (Salleh et al., 2020). Moreover, the combination of mobile and multimedia technologies creates a dynamic online learning environment that supports diverse learning styles and promotes active participation among students. A 2020 study involving 46 culturally and linguistically diverse students found that multimedia presentations, social network tools, and LMS platforms enhanced participation and academic success in online learning. These tools allowed students to contribute meaningfully, supporting active knowledge creation across diverse learning backgrounds (Kumi-Yeboah et al., 2020). This integration not only enhances the learning experience but also prepares students for the demands of a rapidly evolving digital landscape. To maximize the benefits of integrated mobile and multimedia technology, it is crucial to ensure that educators are adequately trained to utilize these

tools effectively in online learning environments. A 2022 study assessed the technological capabilities of secondary school teachers in the Philippines using digital modalities like Google Classroom. It found that most teachers demonstrated "Distinguished" competence, with younger teachers showing significantly higher tech skills than older ones. Despite general proficiency, challenges included managing multiple learning platforms and evaluating student work online. The study emphasizes the need for targeted professional development, especially for older educators, to ensure effective and inclusive integration of digital tools in teaching (Culajara et al., 2022). Additionally, sustained research highlights the necessity for continuous teachers training to effectively implement these technologies, ensuring that online learning remains engaging and effective for all students. Digital tools evolve rapidly. For example, the shift from static online lectures to interactive, multimedia-enhanced modules requires new competencies. Research by (Kerimbayev et al., 2025) showed that teachers must be lifelong learners to stay updated with emerging technologies such as AI-based tutoring systems, gamification apps, and mobile learning platforms. Implementing quality training programs for teachers can enhance their ability to upgrade mobile and multimedia technologies effectively in online learning environments. This commitment to sustained professional development is essential for supporting a culture of innovation in education to be benefiting student learning outcomes and engagement. Furthermore, encouraging innovative teaching methodologies is essential for adapting to the evolving educational landscape and meeting the diverse needs of learners in higher education (Chigbu et al., 2023). This flexibility is essential as mobile technology persistently transforms teaching methods that encourage inclusivity and ensure accessibility for every student across different learning environments (Nechyporenko et al., 2024).

## 8. Conclusion

This article presents the use of mobile and multimedia technologies additionally enhance online learning skills. It highlights that the development of students' online learning skills leads to key 21st-century competencies, including analytical thinking, critical thinking, creativity, communication, and lifelong learning. However, it is also noted that online learning still requires further improvement in supporting creativity, problem-solving, and critical thinking among students.

Multimedia Technologies such as educational games, mobile applications to support online learning and classroom management applications such as Google Classroom, Zoom, and Moodle are essential in collaborate useful source which teachers and students able to access anytime and anywhere. Additionally, multimedia is found to be important in motivating students to engage with content for longer periods, especially through interactive media that increase students' participation. The use of mobile phones effectively supports current learning practices, aligning with diverse learning behaviors and individual differences, therefore promoting digital literacy. Teachers should be able to prioritize and continuously develop their capacity on utilizing mobile technologies in order to promote effective learning for their students by adapting and developing teaching

pedagogy which design interactive activities integrate with multimedia technology. Especially, increased the capacity of online learning to be more effective and encourage learning environment.

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## 10. เอกสารอ้างอิง (References)

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