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Research on the effects of mobile learning on student education helvinder

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Abstract--As mobile devices have become a part of our daily lives, many studies are being conducted on making them more useful for students. It has been found that mobile gadgets are pretty beneficial to pupils, although some studies have found that they are ineffective. Our research on mobile devices in education and learning is summarized in this document, which we hope will be helpful to other educators and students (T&L). These studies have been divided into three main categories: impact and educational environment; specialized applications; and frameworks for mobile learning. " In this paper, we'll look into each of these topics in depth. Our analysis of mobile learning's impact and environment shows that, for the most part, students benefit from the usage of mobile technology by expanding their knowledge and skills. Our study of specialized mobile learning applications showed beneficial effects on learning in numerous sectors. Still, the primary concern was the difficulty of adopting them and the lack of appropriate control guidelines. Different frameworks have been developed for various applications in our review of mobile learning frameworks. Non-technical applications make up most of the use cases. As we've shown, course development and the foundation for mobile learning are not connected. As a result, future course designers must address students' cultural backgrounds and how they use mobile devices to improve engagement and learning.

Keywords--Mobile learning, Student Education, Traditional Learning, Web-based Learning.

Introduction

Students can now access instructional resources via mobile devices, which have grown in popularity over the past decade (Hoi, 2020). Ninety-eight percent of Australians aged 18-24 and ninety-seven percent of those aged 25-34 own a smartphone, respectively (Oviedo-Trespalacios et al., 2019). Mobile devices are becoming more and more prevalent for international students, and this survey's conclusions may be relevant. There are no limitations on when or when students can participate, making it an excellent complement to more traditional teaching techniques (Bernacki et al., 2020).

The primary functions of these gadgets are communication (such as video calls, SMS, and email), online surfing, gaming, and social media sharing and participation. If this resource can be used to improve learning, it will benefit everyone involved, from educational institutions to teachers and students alike (Gómez-Garca et al., 2020).

A shift from a web-based to a mobile-friendly system could significantly impact student learning, as smartphones and mobile apps are becoming increasingly popular. When you have a weak internet connection, you can more easily use mobile apps than web-based ones. Additional features include quizzes, game-based, and gamification-based learning, digital evaluation tools, and podcasts for learning purposes. As a result, mobile learning in future generations of teaching and learning has immense promise (T&L). Web-based T&L strategies have made a significant change in the student experience. Students' learning experiences have greatly improved due to this change, which has freed up their time and effort from otherwise pointless activities (Avci et al., 2021). Moodle, Blackboard, Academic Management System (AMS), ZOOM, and other web-based applications make students' learning more participatory and help students better comprehend and comprehend the material. Technological advancement continues unabated, and one aspect of this advancement is the move toward individualized T&L. Personalized learning is one of the benefits of mobile technology (Whalley et al., 2021). As a result of mobile technology's ability to facilitate real-time communication and feedback and learning possibilities that can be accessed from virtually anywhere at any time (Pangeni, 2021). As a result, there are both advantages and drawbacks to using mobile technology in the classroom. During the COVID-19 term, mobile learning gives added comfort and convenience.

Mobile technology makes learning easier in and out of the classroom. There have been a lot of discussions recently about the use of mobile technology in education, including studies on the effects of distractions on task performance (Hsu et al., 2021) and the provision of course and exam information (OConnor & Stricklan, 2021), as well as studies on how to engage math students in a class (Attard, 2018). (Pandey et al., 2022).

The remainder of the document is formatted similarly. The history of mobile-enabled education and the article's review objectives are discussed in Section II. There was an investigation into how mobile technology is employed in T&L scenarios in Section III of the paper. Section IV contains the final thoughts and ideas for the future.

Background

With Learning Management Systems (LMSs) in higher education, students can get their hands-on educational resources whenever and wherever they want. Despite this, many students and employees have difficulty utilizing the LMS to its full potential (Rahardja et al., 2022). Web-based applications are more challenging for students than mobile apps since many students reside off-campus, and internet service might be spotty. As a result, mobile learning materials such as mobile Apps and course structures compatible with mobile technology must be examined.

Mobile technology has a significant impact on modern society, particularly on the daily lives of young people. Students' learning patterns may have changed due to the widespread use of mobile devices and technology. The vast majority of international students and locals alike work and travel throughout their time in school, which is valid for both groups. Students can also benefit from mobile technology, which allows them to access learning materials at their speed and provides a platform for gamification and game-based learning as teaching aids. This means that mobile technology can have a significant impact on student learning. To better understand how mobile learning might benefit students' educational outcomes, the researchers at Melbourne's MIT are conducting this study. It is the goal of this research to:

Learn how mobile technology affects learning in various educational settings.

The current uses of mobile technology in education and how it might be improved upon.

Methodologies and frameworks should be recommended for future mobile learning in a networking course.

Recommendations for further reading

Collaboration in education is increasingly dependent on mobile technologies (Labonté & Smith, 2022). An abundance of research has been conducted on mobile technology and its application in transportation and logistics (T&L). Many of the reviewers found that mobile-based collaborative learning outperformed internet-based collaborative learning. According to what they discovered, the reviewers have developed an educational model based on their findings:

The book's critics are particularly interested in how students use mobile devices in the classroom. There are two sides to the most important findings of the review. Students' use of mobile devices is a significant source of distraction, which negatively impacts their concentration and commitment in class. On the bright

side, pupils will acquire new methods of thinking and tackling challenges. This article explores the topic of mobile learning for higher education (Alturki & Aldraiweesh, 2022). (Lal et al., 2022) explains how mobile technology can be used to enhance the quality of e-learning. Even while mobile technologies provide the ideal environment for e-learning, their appropriate implementation is riddled with obstacles.

From three perspectives: effect and learning environment, specific apps, and a framework, this study intends to undertake a literature evaluation on the use of mobile technology in T&L.

Spaces for Emotion and Instruction

Here, we'll give an overview of how mobile devices affect student learning in various educational contexts. We begin by identifying impact and learning settings before we can analyze their relationship. Students can benefit and be harmed by mobile devices in education. If mobile technology isn't put to good use, it might have either a favorable or unfavorable effect on kids. When creating learning environments, designers consider how students will interact with mobile devices. Learning can take place in various places, although classrooms and other educational facilities are the most prevalent of them. Within the school and "in the classroom setting" are two words that have become synonymous in this context. Outside of the classroom, there is a wide range of scenery. An out-of-classroom learning scenario is conceivable, such as a hybrid of classroom and online instruction. Some learning can occur in the school, while other activities (quizzes and assignments) can be completed online. In an entire e-learning scenario, all of the education takes place online.

One study had a mixed impact, while others had a negative effect. According to (Zainal & Mohd Matore, 2021), there are two types of teachers: those who are creative and those who are merely functional. In contrast to instrumental teachers who adhere to a more traditional approach to education, innovators want to move away from a teacher-centered model and toward one that emphasizes the student. According to Chen and deNoyelles, a greater awareness of students' mobility practices encourages universities to provide more student-centered support. College students are increasingly using mobile devices to learn outside of the classroom, and this trend is projected to continue shortly (Hsu & Lin, 2022).

"The use of portable technology to support classroom learning and the use of personal mobile devices for on-the-go learning" has been agreed upon. According to the research, students' test scores were significantly impacted by their use of mobile devices. An increase in the student's willingness to learn has resulted in an overall improvement in their academic abilities.

"Deliberate and active use of cellphones for educational objectives" (Zainal et al., 2022) is advocated by the authors in their paper. As a result of exhibiting these characteristics, the authors contend that students will be more engaged and, as a result, achieve better academic results. Mobile learning has a place in mainstream education, according to (Sarrab et al., 2018), and educational

providers will benefit as a result. Students will benefit from a new teacher role that emphasizes learning management instead of delivery. In addition to providing a novel learning environment, mobile technology has a vital role in teaching and learning. According to (O'connor & Andrews, 2018), mobile technologies can improve the learning environment. Mobile technologies can help create a more collaborative classroom, which is critical when dealing with kids from diverse cultural backgrounds and languages. To foster a cooperative atmosphere, it is essential to incorporate features such as adaptable use, continuous usage, immediate feedback, punishment, and opportunities for social interaction and active participation. It is one of the drawbacks of mobile learning because students cannot work together in groups and interact in person.

The use of mobile devices in teaching and learning has negatively influenced some studies (B. Guruge et al., 2021). According to Froese et al., texting interferes with classroom learning, who researched the impact of cell phone use on education. According to the findings, students' learning ability could be harmed by using smartphones. Student expectations of disruption were more significant than the actual degree of disturbance, which indicates that even good students can suffer from low performance due to interruption.

According to the findings (Chao, 2019), there is some evidence that mobile learning impacts. When students use mobile technology correctly in and beyond the classroom, their academic and personal success can be enhanced. Some concerns have been raised, but the advantages far outweigh the drawbacks. Another area of study is critical thinking and a collaborative atmosphere. According to the research, in a collaborative atmosphere, eye contact and face-to-face connection are essential, but technology does not promote this. The author has separated mobile technology into two categories for critical thinking: mobile phones and laptops. Laptops were found to aid students' critical thinking and involvement, while mobile phones served as sources of distraction.

Table I summarizes the findings of a review of the influence and environment of mobile learning on students. According to our results, the majority of studies found a beneficial effect. A few studies have shown a harmful effect, but the tremendous impact dramatically outweighs the adverse impact. Overall, mobile technology was effective in most out-of-class scenarios, whether remote or partially online, or on the go (leaning while driving, for example). As a result, we can conclude that mobile devices have a significant effect on student's academic success.

Specified Use Cases

Mobile technology is reviewed in this section, focusing on specific applications. The subject matter, audience type, scope of use, and particular study purpose all play a role in determining which mobile technology is chosen in this evaluation.

There is evidence that using iPads by supervising doctors and third-year students during clerkships improves access to medical information and evidence-based decision-making (Johnson & Howard, 2019). Despite these benefits, the authors

warn that training and motivation for older generations to accept new technologies will be challenging.

According to Simon, the usage of instant messaging apps like WhatsApp outside of the classroom can help pupils learn more effectively. WhatsApp was utilized in the T&L of a database course in teacher training to supplement the face-to-face class to exchange academic knowledge. Despite the beneficial impact, the author argues that the timing of engagement and not interfering with students' personal lives are crucial considerations for the tools' performance.

Table I
Mobile learning's impact and environment

Reference (Year)	Surroundings	Devices and Instructional Level	Impact
[21] (016)	In person	A high school education plus a tablet computer	Positive
[23] (017)	Out-of-school	Smart phones and higher education	Positive
[24] (008)	Any	A wide range of platforms and mobile devices	Positive
[25] (019)	Classes and non-class activities	Mobile devices for language learning	Positive
[26] (014)	Out-of-school	Higher education and smartphones	Positive impact-exploring options
[22] (014)	Any	Levels and gadgets	Positive with some challenges
[29] (018)	Both	High-school students' mobile phones and laptops	Positive and Negative both
[27] (014)	In person	iPhone and higher education	Negative
[28] (013)	In-school	All levels of cell phones	Negative

As mobile technology advances, so may the learning opportunities for those involved in TESOL (those who teach English to speakers of other languages) (Hashim et al., 2018). (TESOL). The ability of students to participate in learning activities outside of the classroom and contribute to more educational opportunities in their local community is feasible. Pupils' relationships with technology are critical to whether mobile devices may be employed as teaching tools. The TACI ratings of the two people can be used to determine how closely they are linked.

There has been research on the usage of mobile phones in teaching and learning at the University of Agriculture (Tian et al., 2022). It has been observed that while both teaching staff and students utilize them, the sort of application they use varies greatly. There was a lack of utilization of advanced learning applications, such as text messaging and phone calls, among the population. Developed mobile applications were hindered by the lack of application support, user knowledge, and expense.

Table II
Mobile learning applications in a global view

Reference (Year)	Surroundings	The main reason for using it
[30] (017)	On-the-job training in the medical field	Using an iPad, you may quickly and easily access medical information and make informed decisions.
[5] (016)	Outside school hour-Teacher training	Instant messaging tools (WhatsApp) to supplement regular class
[31] (014)	Out-of-school	Teaching English as a Second Language
[32] (013)	Institution of higher education (Agriculture)	Mobile phone in T&L Process
[32] (013)	Product design course	mobile blogging
[34] (008)	Distance education	promote student retention by employing mobile technology to enhance the student support system
[35] (016)	Learning by Solving Problems	access information before discussion and record keeping
[35] (016)	Deaf/Hard-ToHear student	Math Learning
[36] (009)	Pedagogy in higher education	knowledge dissemination

Technology-enabled knowledge dissemination rather than cognitive enhancement is the primary function of university-based information and communication systems (ICT). An attempt has been made in this paper to look at how mobile devices might be used pedagogically by presenting methods for formally integrating them into higher education, guided by two major frameworks for group collaboration, referred to as Authentic Learning and Action Learning by the authors. It has been discovered that mobile technology is an effective tool for improving communication and learning (Shaqour et al., 2021). To promote and enhance student retention, the authors suggested SMS-based mobile technologies.

Student engagement, learning context flexibility, and the quality of student moblogging are all improved due to mobile web 2.0, according to research conducted for the Bachelor of Product Design course (Kazhan et al., 2020). M-visibility Heutagogy, an approach that incorporates evaluation, formative feedback, and adaptation, is key to improving student learning, as is a transition in institutional culture and strategy from pedagogy to heutagogy.

Problem-based learning (PBL) classes can benefit from mobile devices, as highlighted by (Centea & Srinivasan, 2018). Misuse of mobile devices could have the opposite consequence of making them more useful: Students should avoid distractions from technology at all costs. Over-reliance on mobile devices also inhibits critical thinking and teamwork. The best way is to set aside a specific amount of time each day to gather background material on the topic at hand and refrain from using mobile devices.

Szymkowiak et al., 2021) explores how teachers and students in a deaf/Hard-To-Hear (DTH) context perceive math class and recommend that educational technology designers focus on connecting classroom teachers and students via the mobile App. That mobile technologies are being used in this context for learning demonstrates positive results; according to the author,

Adapting material and pedagogy to mobile devices will be a difficult task. It is vital to follow strict time, duration, and purpose guidelines. There are numerous uses and environments depicted in Table II. According to the analysis, there is a good impact on various facets of T&L. To get the intended results.

Frameworks

Following a thorough assessment of the design requirements, implementing an appropriate model or framework is necessary for teaching and learning (T&L). This section will focus on the frameworks and models used in mobile learning contexts. Provides an overview of the most critical aspects of designing a mobile learning environment, including opportunities and challenges (Hamidi & Chavoshi, 2018). A metaphor-based framework provided in the study addressed all of these needs. The suggested framework addresses issues related to the mobile learning context, learning experience, and learning objectives. Individual and group learning are included in these levels, each with its own set of criteria. Ambient Wood, Thinking Tags, Teacher Training, and Mobile Helper are tested in four different learning situations. Despite this, they could agree on one thing: there is still a lot of work to be done.

For example, (Peters & Romero, 2019) emphasized the importance of formal and informal education and how they can be combined in a blended learning environment where the focus is on displaying teamwork, coordination, and communication. Paper described Mobile-Blended Collaborative Learning (MBCL) as a methodology for connecting formal (classroom) and informal learning using mobile technologies and applications (community-based setting). The paper's discussion includes tools for collaboration, coordination, and communication. However, the concept has not been tested in the context of mobile learning.

Changes in the learning and teaching environment, technology, institutional setting, and social networking environment (Bikanga Ada, 2018) are some of the essential requirements of the mobile learning framework. To fully utilize mobile technology and mobility, it is suggested that a framework for mobile learning be developed. Several frameworks were analyzed, and the significant aspects that need to be focused on to improve the usability of mobile technology in students' experiences were found.

Traditional learning paradigms are replaced by mobile learning, which incorporates both formal and casual learning methods. This study (Kali et al., 2018) looked at how mobile learners could benefit from a fluid teaching environment. The authors outlined the necessary measures for making this shift, including teacher professional development, course design incorporating new technology, and student motivation for constructive device use.

When students use iPods, iPads, PCs, Mp3, and Mp4s, as well as other technical devices to access blended learning content, the framework of blended mobility provides additional value to the blended learning approach (Castro, 2019). One of the most well-known methods for teaching English as a foreign language is blended learning (EFL). The authors (Oosthuizen & Roberts, 2021) present a framework for M-learning that considers M-learning's technological, cultural, and theoretical components. Invalidation of the framework and application to student learning is unclear.

Table III
Advanced mobile learning frames

Reference (Year)	Model / Frame	a variety of potential uses
[36] (005)	Mobile education based on metaphors	Applied in four specific learning scenarios
[4] (013)	Mobile-Blended Collaborative Learning (MBCL)	Formal and informal class room
[38] (006)	Enhancing usability of mobile learning	Not specific to any areas
[39] (010)	Seamless learning framework	Not specific to any areas
[40] (019)	Blended learning mobility approach	English as Foreign Language (EFL)
[41] (017)	Mobile learning framework	Higher education
[43] (013)	A general look at the framework	Not specific to any areas
[44] (008)	An e-learning and mobile learning framework	Online and on campus classroom

[45] (018)	Online learning design aspects	Distance education specific to TESOL
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Rather than arguing that mobile devices have no place in the educational process, the study argues that they do. A design for transforming traditional learning content into mobile learning content is also provided in this article. In addition to summarizing other similar projects done at the same university, this document also provides an overview of additional projects. It wasn't easy to understand how to implement the concept because the learning environment was so different from what the author used. They believe that the success of all the projects will lead to an efficient mobile learning environment. On the other hand, the allegation is devoid of evidence and backing.

Mobile connectivity and e-learning are the foundations of the authors' (Todoranova & Penchev, 2020) mobile learning framework. M-learning applications in the framework support personalized and collaborative learning. Students' responses to surveys administered in the classroom and online are used to gauge the framework's effectiveness.

(Alqahtani & Rajkhan, 2020) looked at how students utilize technology to learn, then at the design of an online learning environment. Online learning should be tailored to their needs based on students' mobile phone usage habits, course contents, and time availability. Table III summarizes a study of frameworks for mobile learning that have been utilized or considered. It appears from the review that frameworks and models are primarily geared toward non-technical domains, with a distinct model or framework for each type of application. This means that computer networking courses cannot be taught using a preexisting paradigm or framework. Developing and implementing a mobile learning framework appropriate for the class comes next.

Final comments and suggestions for the future

According to most research, mobile learning has a favorable effect on students' educational experience. Mobile learning can be used in a wide range of educational contexts, and each application has its own unique set of requirements and adaptability. Using a mobile learning strategy, researchers examined the impact, environment, specialized applications, and framework/model of mobile learning. Learning on the go, Our examination of mobile learning frameworks also revealed largely application-specific.

To maximize student involvement while limiting distractions, future research should concentrate on designing mobile applications and mobile learning frameworks that consider how students use their mobile devices, their cultures, and their local environments. When creating and developing courses, additional consideration should be given to mobile learning contexts and surroundings. A lack of a model or framework for mobile learning course development is evident from our investigation. The framework should cover the entire process from course development to deployment to enable mobile learning. In our opinion, the future framework or model should emphasize integrated course development as a

result. In this pandemic COVID-19 phase, mobile learning appears to be more frequent, enhancing the relevance of education or social engagement for future research.

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