Chapter 5
AI for Mobile Learning

5.1 What Is Mobile Learning, and How and Why Did It Become Widespread?

M-Learning or mLearning, short for mobile learning, is a novel approach to online education that uses mobile devices such as smartphones, tablets, digital notebooks, and laptops. With the click of a button, students can access many paid and free resources.

Microlearning, augmented, virtual reality's impact on eLearning, and the growing reliance on smartphones have contributed to a sea change in how students deliver and process information. There has been a considerable shift in the eLearning market because of the rise of mobile learning.

Many premium mobile learning apps now include features like performance assessment, grading, and attendance rate, making it easier for students and their parents to keep tabs on their academic progress.

When creating content for mobile learning apps, developers keep students' unique requirements in mind. This allows students to learn at their own pace and focus on areas where they struggle.

When mobile learning is combined with microlearning, there is a startling increase in the completion rate, from 20% to as high as 80% (Mushavvirkhan-Balooch 2022).

Seventy percent of academic leaders believe online education is as successful as traditional classroom instruction. Another study shows that the retention rate can be increased by 25%–55% when using online learning (Mushavvirkhan-Balooch 2022).

Cretx's chief marketing officer and co-founder, Mushavvirkhan Balooch, has observed that "major changes have been brought to the eLearning business as a result of technological breakthroughs and innovations in the mobile app development industry" (Mushavvirkhan-Balooch 2022). It is now clear that mobile learning has enormous promise because of its adaptability, interaction, and low cost.

M. Kurni et al., *A Beginner's Guide to Introduce Artificial Intelligence in Teaching and Learning*, https://doi.org/10.1007/978-3-031-32653-0_5

Mobile learning will thrive if people have a burning desire to learn.

For several compelling reasons, mobile learning is gaining popularity among students worldwide (Mushavvirkhan-Balooch 2022).

- Study whenever and wherever you like. More people can finish their courses as a result.
- The level of interest from students is boosted through a customized curriculum.
- It is learner-centered.
- Being accessible around the clock adds versatility.
- Content that can be consumed in small bites speeds up the learning process.
- It is cost-efficient.
- Supports a collaborative learning environment.
- Graphically rich content.

Incorporating the possibilities of mobile technology into information and curriculum is genuinely altering education worldwide.

5.2 Why Adopt Mobile Learning?

The excitement and interest that mobile learning has inspired among students worldwide are worth investigating. Here are some vital benefits (Mushavvirkhan-Balooch 2022) (see Fig. 5.1) of adopting mobile learning.

- *On-the-go learning:* Students are no longer required to be physically present at their desks to pursue their academic interests. In addition, mobile learning provides access to carefully curated content in videos, audio, and podcasts at any time and from any location.
- *Dynamic learning:* Every single kid has his or her unique learning style. Some people learn best by listening, while others do better by seeing. Instead of relying on the tried-and-true method of reading and writing, modern mobile learning has

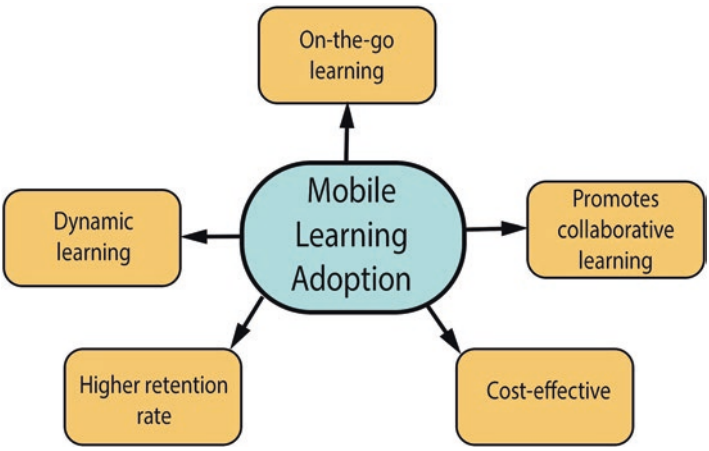

Fig. 5.1 Benefits of adopting mobile learning

brought more exciting and engaging learning formats such as pictures, videos, audio, and slide shows. It is safe to assume that a more innovative and interactive approach to education has become the standard.

- *Higher retention rate:* The goal of providing courses optimized for mobile devices is to make even the most complex subjects more accessible. "Microlearning" refers to breaking down large amounts of content into smaller, more manageable pieces that are then presented aesthetically appealing formats. Because of this, learning as a whole is efficient, helping students retain more information.
- *Promotes collaborative learning:* Mobile learning platforms aim to facilitate a pleasant educational environment by connecting teachers and students in a virtual space to exchange ideas and work together to achieve a common goal. The exchange of information between the teacher and the student is two-way since the latter can contribute their thoughts and ideas to the former.
- *Cost-effective:* It is no secret that mobile learning's low price tag is one of its most appealing aspects. Teachers may create and distribute web and mobile app content using a web-based authoring system, making it accessible to students anytime and anywhere.

5.3 Key Characteristics of mLearning

The following are some of the main characteristics (see Fig. 5.2) features of mobile learning (Simplilearn. 2022) that make it useful for training and education:

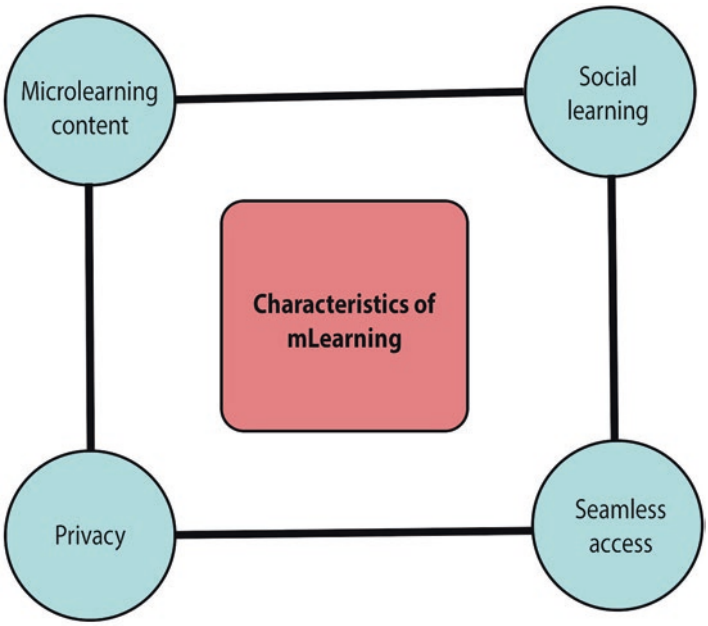

Fig. 5.2 Key characteristics of mLearning

- *Microlearning content:* Microlearning, typically delivered via mobile learning, lasts two to five. Learners' interest is sustained, and the information's clarity and relevance enhance their retention.
- *Social learning:* Using social learning in mobile learning has
- increased student participation. The newsfeed, forums, chat feature, or comments area can all be used to facilitate student-to-student communication and exchange ideas and information.
- *Seamless access:* To reduce barriers and boost participation, many mobile-based training systems integrate course materials directly into the native app, bypassing the need for users to log in first.
- *Privacy:* Nobody can snoop on them and see how they are doing or access any information they want to keep private.

5.4 What Are the Challenges That Mobile Learning in Education Overcomes?

Some of the most significant challenges (Hurix 2019) that can be overcome with the aid of m-Learning include:

- *Lack of tailored learning approaches:* No matter how advanced a university or school is, there is always room to improve how it engages its students. As a goal, catering to each student's unique learning requirements and preferred methods of instruction is sometimes impossible in the standard classroom setting. However, mobile learning can be more participatory and customized to learners' preferences. Students using M-Learning can select from various instructional media, including videos, infographics, and audio, to help them easily understand a specific subject, which has been shown to increase engagement and retention. As a result, students are more actively involved in the learning process, which improves their comprehension.
- *Lack of analytics and data to benchmark performance:* The lack of sufficient data and analytics to compare student accomplishments is a problem most educational institutions face. In order to have a more complete and nuanced picture of each student's progress, mobile learning enables educators to track and benchmark performance across many factors, such as student history or subject.
- *Less qualified teachers:* Due to a lack of efficient teaching methods and lesson plans, instructors who are not as well-qualified or training cannot make significant contributions. This difficulty is lessened by mobile learning in the classroom because of the availability of specialized resources that facilitate trainers' and teachers' exchange of successful teaching methods.

5.5 Role of Mobile Learning Solutions in the Education Industry

There are many more contexts in which the term "mobile" can be applied than just in telecommunications. The same is used in education, with a recent example being "learning during the lockdown."

Mobile learning (mLearning) was 90% efficient in a 2019 study (Sugermint 2019). Due to this, the mobile learning solutions market reached $27.32 billion in 2019 (Sugermint 2019). With its rising popularity and bright future, companies are creating their mLearning solutions or teaming up with a mobile learning services provider.

The mLearning industry is proliferating, incorporating new features to improve the quality of its daily interactive lessons. It is important to remember that mobile learning is a subset of eLearning that has expanded nine hundred percent over the past two decades. You may also be wondering what role, if any, mLearning courses played in the evolution of the educational sector.

Positive Impact During the Lockdown Nearly eighty-five percent of businesses experienced a learning crisis due to the COVID-19 pandemic. Everyone wants to know how to close the learning gap. Mobile learning made it possible to have dynamic classes on mobile devices. Remember that students of all ages, from all walks of life, and in various organizations take mLearning courses.

One study found that half of all businesses saw an improvement in performance after implementing mLearning solutions. mLearning offers numerous advantages, like ease of use and customization for different learners.

Accessibility According to the data, nearly a billion students could not get any schoolwork done during the lockdown. There is a universal fear that the learning issue may worsen during this pandemic.

So, most benefited from the education provided through mobile learning solutions. Smartphones' use extends beyond making calls; they may also be used for research and education.

Nearly 91 percent of smartphone users who are also students spend between 5 and 6 hours daily studying (Sugermint 2019). Using media like online videos, live sessions, and customized mobile apps, educational institutions were better able to manage learning content by demand. Indeed, if we infer that mLearning is an efficient tailor-made learning solution, we would not be wrong!

Collaborative Learning The rise of online socializing is an emerging trend in education. Some examples of social media learning environments include online discussion boards, real-time chats, and dedicated learning community websites.

The convenience of their incorporation into mobile apps is another plus. With just a few clicks, you may access learning modules and work with students worldwide, regardless of their language, culture, or background.

This is one of the many advantages of mLearning programs. As things are right now, there is no shortage of mLearning courses that include social media in their instruction.

Learning reports can be shared on social media, or educators can be contacted to provide information. As a result of its success, this strategy is employed by 60% of academic institutions and 80% of businesses. It has also been shown that 52% of students in grades 6–9 have access to tablets and smartphones for collaborative learning (Sugermint 2019).

Multi-device Support Smartphones and tablets are becoming more popular than personal computers and laptops. The reality remains that 30% of all mobile students still favor desktop or laptop computers as their primary learning devices.

Also, mLearning courses are compatible with more devices than any other type of eLearning module. This is why mLearning accounts for 21.45% of the total eLearning market (Sugermint 2019).

Many different mLearning modules are available, including videos, PDFs, gamification courses, and more. All devices and storage options are compatible with mLearning courses, so you may keep them on a flash drive or the cloud.

Productivity Undeniably, people who use mobile devices like you are more efficient than people who use computers. This is because people are more likely to actively participate in games and apps on their smartphones than on their laptops.

Data shows that those who use the Internet through their mobile devices are 43% more productive than those who use a computer. This is why BYOD (Bring Your Own Device) has been adopted by 70% of US organizations (Sugermint 2019).

This in no way discredits the usefulness of computer machine learning. However, students expect adaptability in their education, and mobile devices are convenient for on-the-go study. That means that studying continues unabatedly regardless of the time of day.

The Information Is Available at the Fingertips In this age of instant information, nobody has time to waste on library research. The online repository of books is on the rise. It is easy to access any and all modules. As a result, mLearning apps compile all available educational resources into one convenient digital library.

One piece of evidence suggests that mobile learning has a 40% higher completion rate than traditional approaches. Moreover, it can be learned in half the time it would take using traditional approaches.

5.6 Key Benefits of Mobile Learning for Higher Education Students

Some of the most forward-thinking universities are capitalizing on mobile learning because it improves learner engagement and increases graduation rates. We will go over each of these (see Fig. 5.3) in more detail below (Hurix 2019):

- *On-the-go learning:* The portability of mobile devices makes it possible to study whenever and wherever is most convenient. Using audio, video, podcasts, and other multimedia assets on mobile devices, m-Learning allows users to tailor their education to their unique learning preferences.
- *Better collaboration:* Using mobile devices in the classroom facilitates student participation and group projects that strengthen the online learning environment. This is a significant benefit of mobile learning compared to more traditional methods of education when student interaction is typically limited to the classroom.
- *Multi-device support:* Multi-device compatibility is another major perk of mobile learning in the classroom. In contrast to previous forms of online education, the mobile learning environment allows for a unified course experience across multiple platforms and devices.
- *Higher retention and better completion rates:* Learners have much freedom with m-Learning platforms because the content is broken into small, manageable chunks. As a result, students are more likely to finish their courses, retain more information, and have a profoundly positive experience with mobile learning.
- *Engaging design formats to learn from:* Diverse and engaging design forms, such as interactive videos, animated movies, and so on, are featured in M-Learning and are often favored by students. This kind of customization in education increases motivation and keeps students on track with their training.
- *Driving performance:* Given the proliferation of mobile Internet access, schools have turned to m-Learning to serve their student's educational needs better and boost their academic standing. Online training courses consisting of videos and images can be broken down into bite-sized segments and delivered to mobile devices. These quick courses' content can be exciting to provide just-in-time pedagogical aid.

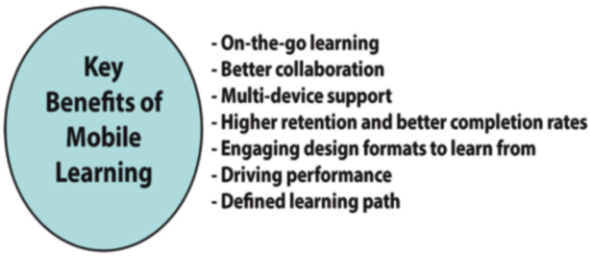

Fig. 5.3 Key benefits of mobile learning for higher education students

- *Defined learning path:* One reason why m-Learning programs are so well-liked is that they offer a flexible and adaptable curriculum that can be tailored to each student. Students appreciate the practicality of m-Learning platforms that incorporate course organizers and push notifications for reminders on their mobile devices. In addition, they get constant access to the latest information on courses and suggestions.

5.7 The Impact of Mobile Learning on the Future of Education

As a result of our constant connectivity to nearly endless volumes of raw data and information, mobile devices like smartphones and tablets are drastically altering how we access our collective knowledge sources. From quick culinary videos on YouTube to full college degrees available at your fingertips, fast access to specialized knowledge is at an all-time high. Exciting new kinds of learning are capturing people's attention worldwide, but the established educational system still fails to take advantage of the many possibilities in this field.

This section introduces ten overarching concepts (Sergio 2012) that will likely inspire new approaches to mLearning's development.

- *Continuous Learning:* Until recently, "education" was seen as something that happened only once in a person's life, from the time they started school at age five until they graduated from college. There was a time limit on schooling before it was on to the working world. This approach, developed during the industrial era, is becoming increasingly outdated and irrelevant to modern life. Increasingly, we cannot go about our day without encountering educational content. People of all ages, from 11-year-olds to retirees, are taking advantage of free online courses to learn about cutting-edge topics like artificial intelligence, computer science, and game theory in their leisure time. We learn how to utilize new professional software or how to mend our broken equipment by reading articles on our phones, tablets, and computers. Today's children are among the first to be born within touching distance of a connected personal gadget, so continuous learning will be taken as read.
- *Educational Leapfrogging:* People constantly learn new things, even in less-advanced societies. A portable classroom allows students to study whenever and wherever they like, whether during brief breaks in the day, late at night, or as background "music" as they get work done. Many students in low-income areas who are engaging in technological leapfrog will also be able to bypass antiquated formal school systems due to the widespread availability of inexpensive computers, tablets, and cell phones. This is especially important for kids from low-income homes who may have to start working at a young age to help support their families or who may not reside in a neighborhood with access to exemplary educational opportunities.

- *A New Crop of Older, Lifelong Learners (and Educators):* The continuous learning phenomenon has a side effect: today's grandparents, watching their grandchildren grow up with a touchscreen in their hands, are more interested than ever in mLearning. Tablets and other touch-enabled gadgets have drastically lowered the computer's perceived complexity, making it easier for seniors to keep in touch with their middle-aged children and grandchildren through digital mediums like email, Facebook, Twitter, and Skype. This segment of the population has the leisure and interest to take online classes for fun, but they also present an untapped market for more practical use of that spare time: In many parts of the world, there is a severe shortage of trained teachers, but this problem could be solved if retirees took up teaching, especially if they did so remotely through mLearning.
- *Breaking Gender Boundaries, Reducing Physical Burdens:* mLearning has the potential to provide girls and women of all ages with access to high-quality education on their own time in settings where this may not have been possible in the past due to centuries-old cultural practices. Similarly, mLearning facilitates access to higher education for individuals who, due to severe impairments, cannot regularly visit a traditional classroom or campus. Therefore, members of these communities are empowered to make decisions about their academic and occupational futures. In either instance, previously hidden liberties become accessible.
- *A New Literacy Emerges: Software Literacy:* The advent of mLearning has the potential to spark a renaissance in the study of software programming languages, which have all the makings of a global lingua franca. This is already taking place; numerous new online firms, such as Codecademy, provide interactive education to help individuals learn to comprehend and create computer programs. Codecademy has more than a million "students" and has raised roughly $three million in venture money. This is especially true in developing nations, where a skilled software development workforce may open up new avenues for economic growth and equip communities to meet previously unmet demands. When considering fostering software literacy and local entrepreneurship, one needs to consider the success of organizations like Ushahidi, which has been sponsoring a high-tech social accelerator called iHUB in Nairobi.
- *Education's Long Tail:* A wealth of educational resources could be available through mLearning solutions. YouTube, Vimeo, and other video-sharing platforms provide helpful guides, tutorials, and complete lessons that can be reaggregated by topic and packaged as educational content. The latest TED-Ed project is an excellent example of the possibility presented by the innovative repurposing of established, high-quality teaching materials. It was popularized by Salman Khan, an MIT grad whose eponymous academy "flips" the traditional education approach by having students learn new material at home and then apply it in class through practice and discussion. Others have used social platforms to share videos to disseminate spontaneously produced instructional content. Materials for mobile learning can come from various sources, from grandparents explaining how to make traditional foods to businesses exhibiting how to place solar panels on mud huts, and the knowledge they impart is invaluable. Having a video-capable smartphone is not always necessary, as the type and

difficulty of educational resources might vary substantially. Many humanitarian organizations, like MAMA, have successfully used text messages to educate expectant and new mothers in underdeveloped countries on pregnancy, childbirth, and infant care. These instances demonstrate the potential of mLearning to cater to a wide variety of specific user groups.

- *Teachers and Pupils Trade Roles:* The same portable, Internet-connected gadgets that provide children and adults access to existing edtech allow them to record and distribute their insights. Imagine a 12-year-old boy teaching nurses, doctors, and parents how to communicate health information to him in a way he can understand. Imagine, then, a world in which young children are taught to code and produce videos from an early age, and these children go on to create and teach their educational materials to their peers and even adults, whose perspectives on the world are thus broadened by being exposed to those of children.
- *Synergies with Mobile Banking and Mobile Health Initiatives:* Others working on new mLearning ecosystems would study the experiences of those who came before them in mobile banking and mobile healthcare. It is possible to combine mLearning, mHealth, and mFinance in more fruitful ways than simply adapting unique ideas, such as sending short lessons, teacher feedback, and grades by text message. In whatever order, the product of these three variables will be greater than the sum of their parts. This positive feedback loop has excellent promise to boost local, national, and global economies, whether applied on a small or large scale. After all, a higher standard of education is a simple way to boost people's standard of living and even their health.
- *New Opportunities for Traditional Educational Institutions:* Harvard and MIT's announcement that they will partner to provide open online courses through their nonprofit firm edX presented an intriguing new concept. The rise of mLearning will not replace traditional education but will enhance and broaden the scope of what is already available. The two schools want to use the students' reactions to the courses to inform their future remote education strategies. Established universities, perhaps realizing they missed specific opportunities in the early 2000s, are now looking at mLearning to find new prospective students or study how people learn. By tapping into their enormous and established networks of students, staff, and alums, traditional institutions can aid mLearning solutions' rapid expansion. Global Industry Analysts produced a report, "The business potential could also be big," in February 2012, predicting that the global online and other electronic distance learning market will reach $107 billion by 2015. This indicates substantial commercial potential.
- *A Revolution Leading to Customized Education:* Successfully directing the mLearning revolution will need more than automating today's educational practices. MLearning indeed has enormous commercial potential, but what makes these solutions truly exciting and rewarding is the possibility that they will enable students of all ages and walks of life to pursue and acquire meaningful, relevant, and practical knowledge to help them succeed in their own lives. The true allure lies in individuals' freedom to chart their courses, make the most of their gifts, and pursue their true calling.

5.8 Pros and Cons of Mobile Learning

Let us check out (see Fig. 5.4) the pros and cons (Simplilearn. 2022) of mobile learning.

Pros of Mobile Learning

- *Availability:* Students can quickly and easily access relevant resources whenever needed.
- *Usability:* When using an M-Learning platform, the focus is on completing specific tasks. It offers practical advice through tutorials, step-by-step guidelines, and exercises designed to put newly acquired knowledge into practice.
- *Convenient size:* The lessons and assignments can be easily incorporated into busy schedules.
- *Social touch:* Students can consult with one another and their teachers when they need help or advice. They have the option of commenting and maintaining a sense of community.
- *Engagement:* For the student, it adds no further work. There is more interaction between teachers and students.
- *Cost-effective:* This method of education is less expensive than the standard classroom setting. It reduces the need for a physical location, equipment, trainers' salaries, and transportation costs. Since students can use their gadgets during instruction, costly computer classrooms can be avoided.

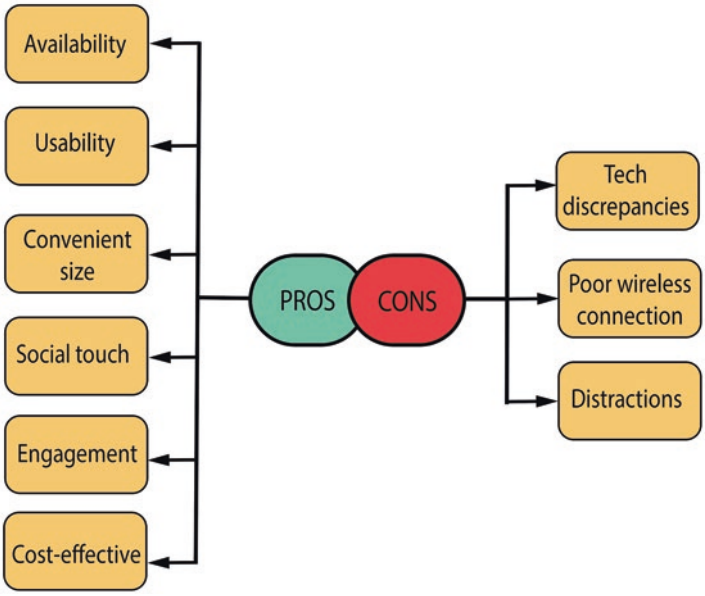

Fig. 5.4 Pros and cons of mobile learning

Cons of Mobile Learning

- *Tech discrepancies*: The mobile learning experience is hindered by mobile devices having wildly different storage and processing capacities.
- *Poor wireless connection:* In many outlying areas, there is a lack of cell phone service and, consequently, poor Internet connectivity.
- *Distractions:* Distractions during training include checking phones and social media, which might lessen the efficiency of the training.

5.9 How Are Mobile Learning Apps Taking Advantage of AI?

One of the most important factors influencing the expansion of many markets, including the online learning industry, is the rise of AI.

It is also being put to good use in the development of novel mobile applications that provide consumers with expanded capabilities. This technology has gradually become an essential part of the educational system and has brought about profound changes in teaching and learning.

Mobile learning apps with the assistance of artificial intelligence are helpful not only for children in elementary school through university but also for professionals and businesses. The outcomes of learning and productivity both benefit from this.

This section discusses how artificial intelligence (AI) revolutionizes mobile learning apps (Kizhakedath 2021). In addition, you can use these apps to learn not only in the classroom, at university, in the workplace, or in your day-to-day life. Instead of taking traditional piano lessons, you may learn the instrument with the help of artificial intelligence at Skoove.

- *Improving Administrative Operations:* The automation of routine administrative duties in educational institutions is a promising area of application for artificial intelligence in mobile learning apps. One example of such work is the faster and more precise marking of essays and exams. The same principle can be applied to the admissions process to ensure that all applicants are objectively evaluated and considered. With the help of AI-powered intelligent assistants, we can close the communication gap between schools and their students. This is used in mobile learning apps using chatbots, which provide students with answers to their questions and direct them to the appropriate admissions or support departments.
- *Connecting Students with Teachers:* Mobile learning apps driven by AI can potentially revolutionize education from kindergarten to graduate school. Most programmers focus on making AI-powered learning apps for students who struggle to articulate their needs to their instructors and tutors. Students with unique needs, disabilities, or circumstances that prevent them from attending a traditional classroom can benefit from AI-assisted, individualized instruction. As a bonus, mobile learning apps can single out students who could benefit the most

from supplementary materials and pinpoint individual areas of difficulty. This provides an opportunity for a more tailored education to aid their development as students. Moreover, it helps students and teachers connect and work collaboratively.

- *Flexibility in Course Development:* Mobile learning apps powered by AI are helpful for students and instructors in designing lessons. Educators can better pinpoint students' areas of weakness with the help of these apps' intuitive and insightful suggestions for enhancing their teaching content. Some educational apps for mobile devices can send notifications to teachers if multiple students submit incorrect answers to a question or attempt an assignment using the wrong strategy. So, the software can help students better grasp the ideas they are struggling with. They can also access sample exams and supplementary readings to help them prepare for future assessments and enrich their knowledge.
- *Smart Lessons and Experiential Learning:* Traditionally, a teacher would instruct a big class in physical activity, and all students would be expected to follow along and absorb the material. Students have the right to ask questions, but most lack confidence in doing so in class. Plus, not every student will absorb information at the same rate. This is where educational apps for mobile devices come in helpful. As a result of advancements in AI, these apps may now be utilized to automatically create insightful and tailor-made courses for each student. Students can use the classes to meet their individual educational goals. They can access reading materials in various disciplines, from mathematics and physics to history and geography. The AI-driven platform can evaluate student work and provide feedback through reports and comparisons, allowing for easier self-evaluation. As a result, students who require supplementary instruction can progress at their own pace and without unduly stressful pressure.
- *Microlearning:* In a traditional classroom setting, students commit to a lengthy two- to five-year course or degree program. They will not be able to take individual lessons or receive individualized instruction in areas needing improvement. Here is where artificial intelligence-powered mobile learning apps come in handy. Several online learning apps allow you to sign up for a single course or class to acquire new knowledge and abilities. The popular term for this strategy is "micro-learning," which refers to how professors and instructors present information to students in bite-sized chunks and packages that improve retention and comprehension. Text, pictures, videos, music, and even games can all be used to deliver microlearning content to students, including the youngest ones. Furthermore, it allows students to learn at their own pace and in their manner. They are also less time-consuming and cheaper for educators to prepare.
- *Professional Education and Training:* Professional education and training is another area where AI is utilized for mobile learning apps. This is where businesses train their staff and provide them with courses and learning content to advance in their jobs. In addition, the learning curve presented by these digital learning apps for professionals may be easily negotiated.

5.10 How AI Is Changing the Mobile Learning Education Game

Today's tech-driven world has helped every industry. There has been a recent uptick in businesses and individuals who see the potential in implementing AI-powered software to improve their daily operations. Effects of AI are also being felt in the mobile education sector, as younger students are increasingly turning to digital devices for their education.

Artificial intelligence (AI) allows teachers to tailor their lessons to each student, ensuring their attention is focused on the presented material. As a result of this shift, there has been a meteoric rise in the popularity of educational apps designed for mobile devices.

Let us look at the revolutionary impact of AI (see Fig. 5.5) on the mobile learning industry (Sales POP Guest Post 2021):

- *Personalized Learning:* According to Gates/RAND Studies (Herold 2016), students do better when given greater freedom in their educational setting. A personalized learning program can help the most academically challenged students reach their full potential. Each student has unique strengths and weaknesses, requiring a unique learning approach. Through AI, course materials may be adapted to each student's learning style and pace, improving their overall performance in class.
- *Tailored Content:* Online courses are ineffective if they only require students to watch videos and memorize material. They have a limited attention span and will soon stop listening to their teacher. Artificial intelligence can be used to reorganize the course content into more manageable chunks to aid students' retention and comprehension. In addition, lectures can be turned into videos and podcasts to keep students interested for much longer.

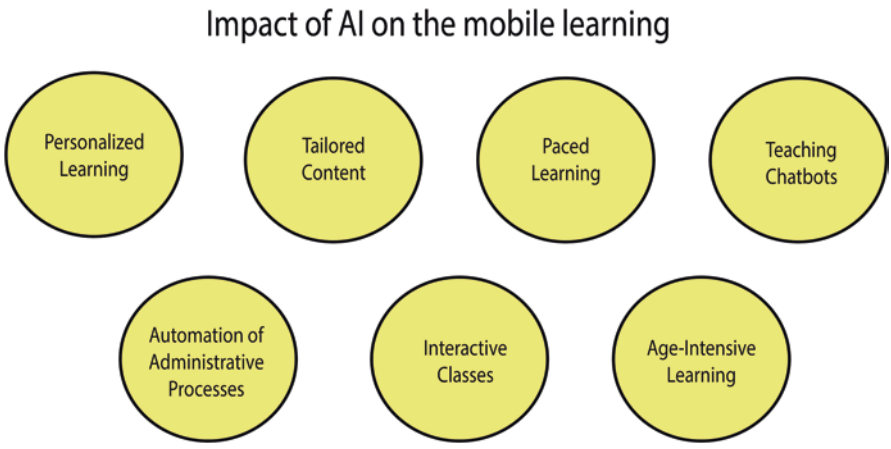

Fig. 5.5 Impact of AI on the mobile learning

- *Paced Learning:* Rather than being forced to adhere to a rigid schedule, students can take their courses and progress through the material at their leisure with the help of AI-powered mobile learning platforms. They can go over each lesson as often as needed before moving on to the next because the course materials and lectures are online and accessible at any time. This is especially helpful for students who cannot attend traditional lectures due to illness or are enrolled in online courses from another country and physically located in a different time zone. Furthermore, AI can translate the subject matter into any language, allowing anyone to take classes and study from the convenience of their own home.
- *Teaching Chatbots:* Artificial intelligence (AI)-driven chatbots have exploded across all sectors, including education and mobile learning. If you have questions about a topic or subject on the learning platform, you can contact a chatbot for help. The chatbot will provide a thorough response based on its extensive database and will do it in a matter of seconds. To avoid missing out on the opportunity to ask a question, you can do so before the next class session begins. This is a massive boon to those who take classes online.
- *Automation of Administrative Processes:* Students are not the only ones who can benefit from AI. In contrast, AI-powered mobile learning solutions can also be helpful for teachers. Even in a virtual classroom, teachers still have much administrative work, such as keeping track of students' attendance and test scores. If an AI-based platform could automate these tasks, educators could devote their full attention to what they do best, i.e., teaching. Moreover, AI can help teachers with grading exams. As soon as students log into an online class, their presence will be noted, and their grades will be added automatically.
- *Interactive Classes:* A few years ago, it would have been impossible to imagine doing something with the help of automated procedures. Still, it is now possible because of the significant advancements in artificial intelligence. People with smartphones can now learn about things like music theory and even more specialized things like piano chords (Shipp 2021) that they could not before. With mobile learning, students have access to all course content, which makes it simpler to follow along with each lesson and remember what they have learned. One example of this trend is the rise of music apps powered by artificial intelligence (AI) that give instant feedback and tailor each class to the user. Adding interactive courses, which enable students to remain actively engaged in each class, is another way AI is upping the ante. You may have noticed that on some educational platforms, a question appears on the screen after the teacher has finished a subtopic, and you can choose an answer by tapping it.
- *Age-Intensive Learning:* One of the primary contributions of AI in the mobile learning education game is that it gives the students age-specific lessons and course content. This means that it may serve everyone interested in expanding their skill set through online instruction, from infants to adults in their forties. You cannot have too many words for little children, so you need films, sounds, and interactive learning games. This can only be made achievable with AI.

5.11 Application of AI in Mobile Learning

Artificial intelligence's (AI's) particular use in mobile education (Liu et al. 2010):

Mobile Intelligent Teaching Expert System (MITES) MITES is a novel form of educational technology that draws from the fields of cognitive and thinking science, integrated artificial intelligence technology, educational psychology, and other related areas of study. A MITES-enabled classroom can be a highly-intelligent one. The approach creates an open, interactive classroom by modeling the minds of professors and professionals and employing cutting-edge tools like artificial intelligence and mobile media. Students can access knowledge from the system on their mobile devices. The system may adapt lessons to students' background information, skill level, and preferred learning style. It has the potential to provide adaptive learning for each student.

MITES aims to investigate the features and methods of study to find a cognitive model of education that will help students learn more quickly and efficiently.

The following forms of intelligence (Liu et al. 2010) are typical of MITES systems:

- It can mechanically produce a wide range of problems and exercises.
- Choose relevant learning content and modify teaching progression by students' varying skill levels.
- As a result of comprehending the course material, the system can solve the problem mechanically and on its own.
- With the ability to generate and interpret natural language, users can easily ask and receive answers to system-related questions, improving human-computer interaction.
- Capable of providing a meaningful context for course material.
- Identifying student mistakes, investigating their root causes, and implementing effective solutions are possible.
- Ability to judge student performance.
- Capable of enhancing one's pedagogical practices indefinitely.

Mobile Intelligent Decision Support System (MIDSS) The MIDSS system comprises several fundamental parts: a database, model base, method base, man-machine interface, and intelligent components. The four-base and fusion structures are two examples of system architectures that can be constructed using these elements. The future of MIDSS in mobile learning applications is promising; as such, it can aid in the identification of decision-making problems, the clarification of decision-making goals, the establishment or modification of a decision-making model, the provision of alternative courses of action, the evaluation and selection of excellent features of human-computer interaction, and the determination of the best course of action.

Mobile Intelligence Information Retrieval Engine (MIIRE) Most information resources used in mobile learning are discovered by students surfing the web. Therefore, one of remote support's crucial aspects is providing information retrieval services of a high standard. The intelligent engine is the foundational technology behind the evolution of the mobile intelligent information retrieval system. Mobile intelligent retrieval aims to power the learning engine with intelligence. Current search engines are server-side programs without intelligence; furthermore, the high-precision retrieval engine needs a formatted input string. If relocating the search engine for the mobile client gives them the ability to self-analyze to grasp the interest of intelligent learners, then they can glean data from the web per the users' desires. MIIRE is a vital component of the navigation system. Personal intelligent navigation systems built on Java, for instance, feature a self-learning function that automatically collects and records the user's browsing habits and, based on the preferences of different users in different navigation, makes recommendations to help users find the relevant resources.

Mobile Intelligent Induct-learning System (MTIS) MTIS provides support services. Mobile education relies heavily on its accompanying support services. Creating, managing, and implementing projects to support mobile learning requires setting up and maintaining a reliable, adaptable, and robust support services subsystem. Effective learning environments are fostered by various services designed to make it simple for students to access the help they need from various sources. The AGENT Mobile Intelligent Guidance System can take the reins when it comes to developing and implementing different learning strategies and leading the charge when it comes to providing personalized services; these objectives are at the very core of distributed artificial intelligence, which seeks to minimize the need for complex software and the implementation of burdensome, repetitive tasks to maximize productivity. A diagnostic function, error diagnosis through the study, analysis, and enhancement of the reasons; automatic correction of guiding strategy through feedback to make it more in line with the learner's knowledge base and cognitive characteristics; and a focus on the learner's future and goals are all hallmarks of effective guidance.

Intelligent Hardware Network (IHN) Employing the IHN is prudent in light of current affairs to make the mobile network smarter. In this context, intelligence refers to "operational intelligence" and "service intelligence." A mobile network's "operational intelligence" refers to its capacity for smooth operation, ongoing upkeep, and expert management. What we mean by "service intelligence" in the context of mobile networks is providing information processing expertise and decision-making tools to end users. In terms of hardware, mobile education relies on the mobile network. With the proliferation of networks and the increasing importance of information in modern society, mobile education online will soon necessitate the integration of multimedia information processing capabilities and the network's provision of high-level information-processing capacity, that is, concerning the processing power of knowledge.

5.12 Using AI to Create Personalized Learning Paths in Mobile Learning

Today's students need on-demand, individualized instruction. L&D professionals may better organizational support objectives by tailoring training and education to each learner's preferences and interests. Using a personalized approach, you may effectively teach your students what they need to know and provide the skills they will use in their careers. It offers students a sense of their educational needs and encourages them to participate actively.

With the help of personalized education, students can get the skills they need to advance in their chosen fields. The term "personalized learning" refers to altering and modifying one's course of study based on specific needs and goals. Personalized learning routes consider the individual learner's preferences, knowledge, experience, and needs, making them superior to a one-size-fits-all approach.

Because of its convenience and efficiency, mobile learning has quickly gained in popularity. You can more effectively teach, re-skill, and up-skill your learners at scale by combining individualized learning paths with mobile training delivery.

Let us look at four approaches (Kumar 2021) to developing personalized learning paths for your students through mobile learning.

1. *Understand Learner Preferences:* Students have different needs and preferences for when, where, and how they study. Some students find infographics, films, and scenario-based instruction helpful in absorbing new knowledge and abilities. Some people learn best by seeing demonstrations or reading guides written by experts in their field, while others learn best by listening to podcasts or watching instructional videos. It is possible that some students would instead learn new material through testing and quizzes. When designing training sessions, keeping students' preferences in mind is crucial. Determine each student's preferred method of receiving information by doing a needs analysis using a self-assessment tool, techniques, and questionnaire.
2. *Use a Learning Experience Platform:* Organizations adopt learning experience platforms (LXPs) to facilitate efficient, personalized training. Learning experience platforms (LPs) are being viewed as a viable replacement for legacy learning management systems (LMSs). Employees can benefit from LXPs' just-in-time and hands-on training as they do their day-to-day job. Newer LXPs facilitate the distribution of dynamic rather than static course materials and aid in managing students' development toward their objectives. The tracking and reporting capabilities of many up-to-date LXPs have also vastly enhanced in recent years. The L&D professionals can use the information in these reports to fill in the gaps in their students' skill sets by creating content specifically designed to address those areas. An LXP allows you to combine internal and external training resources into unified learning paths. These learning pathways can be modified to suit the learner's goals and existing knowledge, making them suitable for personalized learning. Future iterations of LXPs will undoubtedly incorporate even more functions tailored to students.

3. *Use Artificial Intelligence:* To meet the needs of today's students better, consider using AI to design individualized paths for instruction. Learning paths can be effectively tailored by leveraging data created by AI and assessing it. AI aids in detecting knowledge gaps and providing valuable recommendations for filling them. You can also get more accurate information on how students' learning affects their performance: Information such as which courses students are taking, how long it is taking them to finish them, which training delivery mode they prefer, how well they do on exams, and evaluations, and any comments or feedback they have on the effectiveness of the modules can all be gathered by AI. Ultimately, AI can aid L&D professionals in providing tailored content based on their learners' requirements and unique preferences, making courses more relevant to the learners' future work needs.
4. *Obtain Feedback From Your Learners—And Use It:* Learning and development professionals need to understand how to tailor mobile learning paths to the individual needs of their students. Educators can better understand each student's preferred learning style, areas of interest, and requirements using self-assessment tools and artificial intelligence. However, getting honest critiques from your students is also crucial. So, L&D professionals should constantly ask for feedback from students after they finish a program so that they may make any necessary adjustments. Training more tailored to individual students' specific skills, interests, and goals is made possible through personalized mobile learning paths. Using the methods above, you can increase productivity and student interest in your mobile learning paths.

5.13 The Challenges of AI-Based Mobile Learning

This section investigates two significant issues (UKEssays 2018) related to AI-based mobile education. The evolution of soft tools and the resolution of technical issues come into play.

- *Technical problems:* The success of mobile learning enabled by artificial intelligence depends on the quality of the mobile learning environment, as well as the speed and precision of the enabling technology. There are still technical challenges with this learning style, which may persist for the foreseeable future. Regarding wireless communication, the latest and greatest is, without a doubt, third-generation (3G) technologies. As mobile wireless technology continues to make an indelible impression on the next generation, it, too, necessitates a maximum transfer rate. The rising demand for cellular networks has resulted in an additional cost to Internet use that will not go away overnight. Wireless Internet service is prohibitively expensive for the typical consumer. To their dismay, this stymied their plans to utilize wireless Internet. Although the tools for creating mobile apps are expanding rapidly, they still do not do enough to help students study using their devices. Mobile communications equipment will influence future advancements in mobile learning.

- *Development of soft tools:* Due to the early development of AI for mobile learning, the soft tools for AI-powered mobile learning are pretty limited. Most modern software is designed for a different purpose, yet some can be used for private information management. The increasing complexity of these technologies has made using them more cumbersome in many situations. In the long run, educational institutions can only effectively promote mobile learning. However, this challenge presented by mobile learning is best met by collaborative effort. The growth of the mobile business will necessitate the involvement of governments, mobile device makers, and the creators of educational software. Because of this, the advancement of tools could satisfy the requirements of artificial intelligence in mobile education. The progress of AI is accelerating at a rapid pace, and its implementation in mobile learning would usher in a new era of learning that simplifies the process for students.

5.14 Conclusion

We have come a long way in the past decade thanks to advances in artificial intelligence, which have made the seemingly impossible conceivable. Education is the foundation of any society's development, and by adding AI to mobile learning apps and online classrooms, we will be able to produce an entire generation of imaginative thinkers who will carry the technological revolution to new heights.

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