Survey Analysis of Students and Teachers' Perceptions of E-Learning and M-Learning in Morocco

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Abstract—New technology, such as mobile phones and smart devices, has sparked the creation of new methods of learning. They are integrated into modern e-learning systems due to their rising popularity. E-learning and mobile learning provide students with more options for learning without any limitations. Today, many students are adapted to these new technologies as long as they have inherited a naturally tech-savy mindset. We use survey data to explore students' and teachers' interest in e-learning and mobile learning. This survey will help us discover the real value of these subjects in Moroccan higher education. Once we have collected our survey responses, we will be able to determine whether our study has had an impact on the students and teachers participation in these new forms of learning. At the end of the topic, all the answers and the statistics (quantitative and qualitative) that we have collected from our students and teachers' opinions about this study will be shown, analyzed, and discussed.

Keywords—e-learning, m-learning, smart devices, ICT

1 Introduction

The increasing use of information and communication technology in education—referred to as ICTE— has led to a variety of unexpected results. One of these is the increased popularity of online learning training [1]. In the recent past, educators have adopted blended or distance learning methods. This trend is due to various factors: the mobility of learners and teachers, the wide variety of their classes and lesson plans, the extensive use of smart devices and technologies, and the potential uses of social media [2].

This type of teaching benefits from the flexibility, progressiveness, sustainability and accessibility of its methods. These strengths make this type of teaching appealing to both students and teachers; it encourages them to look beyond the traditional ways they learnt, instead of working together to criticize each other's thoughts. Students can benefit from the knowledge and experience of their teachers, and vice versa [3]. This dynamic creates more enriching learning experience than participating alone. Students

who use the platform's video support tools interact more with teachers than other students, engage in more collaborative work sessions, and perform better in school. Tools like video support help foster authentic "virtual" clinical situations that aren't possible using traditional drawing or projection methods. This also allows for problem-based learning, which can't be achieved using traditional teaching methods.

Aware of the inevitable evolution of training methods and technologies and due to the critical situation during the COVID-19 pandemic [4], Moroccan universities have established blended learning for students, using e-learning platforms dedicated to each student professionally.

Developing innovative pedagogy that makes students actors in their learning; universities in Morocco aim to make education more interactive by reducing face-to-face lectures and replacing them with small group lectures. The strategy aims to facilitate the implementation of the reverse classroom approach and ensure the quality of the education provided. To support this pedagogical reform, Moroccan universities are first digitizing teaching to provide teachers and students with all the elements needed for education through digital platforms that are not limited by time, space or support.

Therefore, a charter was developed as part of the digitalization of teaching and innovation in education. They are used to define the standards, means and methodologies for online learning via e-learning platforms (LMS, MOOCs, etc.). With the advance of technology and increased availability of the Internet, the focus is on creating digital platforms and educational environments that make personalized learning more accessible to teachers and students [5]. It is important to carry out a survey to examine all users' perceptions and attitudes toward e-learning and mobile learning.

This article focuses on introducing online learning into the Moroccan education ecosystem to demonstrate new ways in which students and teachers can interact in a smart learning environment. We surveyed students and teachers' overall perceptions of e-learning and m-learning to understand their issues and challenges. This survey will shed new light on the evaluation of online learning. There are common features between e-learning and m-learning, including the characteristics, advantages and disadvantages of each. The proposed survey management comparison is a set of features, structures and mechanisms that should also be supported to meet future needs.

Chapter 2 provides an overview of various research papers on online and mobile learning, and Chapter 3 presents a short pedagogical scenario adapted by prioritizing the digital transformation universities are undergoing, especially during the COVID-19 pandemic. Chapters 4 and 5 describe the different phases of preliminary research that have been adapted to carry out our study, while Chapters 6, 7 and 8 present the results, their summary and future work description.

2 Literature review

Due to rapid technological advances, e-learning is part of the training offerings of many institutions around the world. E-learning is the acquisition and use of knowledge distributed and facilitated mainly by technological progress. It can be fully independent with minimal time and travel constraints. Students can learn in this man-

ner by using LMSs and e-learning platforms such as MOOCs [6][7]. These platforms provide students with a proper environment to study— they include content accessible at any time, videoconferencing according to a schedule, resources from online libraries, collaborative software, quizzes, and assessments personalized to the student's needs, educational animations and simulations in 3D, educational games and even hybrid combinations of traditional learning methods [8].

Electronic learning is the use of technology to improve education. It's also referred to as "e-learning" and "online learning." It uses information and communication technology to transfer knowledge. This can be done anywhere and at any time. Online learning uses hardware that accesses the internet, but it's essential to have an internet connection to use it [9]. E-learning can also be used to strengthen inclusion, improve governance and administration of education, develop teachers' skills and add enrichment to the learning experience [10]. With the help of technology, e-learning is an academic term for computer-assisted learning. E-learning can also be considered a form of distance learning that relies on face-to-face instruction. It's often referred to as "d-learning".

E-learning allows students to learn through self-training, performance, communication, and efficiency through technology [11]. This term can be used to describe any kind of formal education that uses the Internet. It's called e-learning because it uses internet methods to provide solutions that improve learners' performance and knowledge. E-learning uses internet techniques such as online courses, video lectures, and shared assignments [12]. E-learning commonly refers to educational material or experiences offered through technology such as the internet, multimedia, virtual reality apps and video conferences. E-learning also refers to participants' interactive video discussions via the internet [13].

Kumar Basak defines e-learning as the experience dimension of online learning, which encompasses aspects such as dedication, curiosity, practicing, and simulating [14]. E-learning can be defined as using any new technologies or applications to support learning [15]. Learning in the digital age is accomplished using computers, digital media, and information exchange. This process is referred to as e-learning and can take place through traditional classroom settings or digital collaboration. Additional terms for this are computer-based learning, virtual classrooms, and networked classrooms. Teachers can periodically provide students with texts and images for broadcast via the Internet. Alternatively, they can design and deliver an entire predefined show. Doing so allows students to access a wide range of media via websites like YouTube and audio and video programs. Additionally, these resources can include games, 3D animations, text chat, and multimedia files. All of this makes Internet-enabled technologies vital to creating new learning materials.

The foundation of current new technologies in learning methods are the Internet of Things, big data, artificial intelligence, and virtual reality. This requires access to smart devices such as computers and the internet, as well as connectivity to other devices through the IoT. E-learning can be broken down into courses with different modules, learning objects, and either synchronous or asynchronous access [16]. It can be accessed across the globe with specific time limits.

Mobile learning, also called m-learning, allows users to access educational content from a mobile device anytime and anywhere. This includes completing training material at any time and in any location [17].

Studying using mobile devices such as smartphones or tablets is referred to as mobile learning. People can engage in offline learning by traveling on a plane or subway without internet access. Additionally, students can study anytime and anywhere using mobile devices [18]. Tools like virtual reality or 3D can be added to professional educational programs to make them more engaging and addictive. This can be accomplished by using mobile learning platforms such as tablets or smartphones, and it gives people access to learning opportunities that would not otherwise be available to them [19]. In learning programs, students' mental states change into something reminiscent of video games [20]. This phenomenon is referred to as m-learning and encourages teachers to incorporate game-based teaching methods into their lessons. Doing so encourages students to achieve and cooperate during group projects [21] and creates competitive and collaborative relationships between students.

3 Digital pedagogical transformation

Creating innovative pedagogy requires implementing digital learning methods. This is because online classes provide the ability to implement teaching methods intended to motivate students as learners. Additionally, mobile and e-learning help make training more interactive by replacing face-to-face instruction with blended learning. The reason why this is important is that it allows educators to use pedagogy intended to improve their training. The use of e-Learning and ICT aids in the optimization of pedagogical evolutions [22]. These systems provide teachers with intuitive e-learning tools that anybody can use. This helps students evolve beyond time, place, or support. All traditional teaching contents should be digitalized and transcribed into electronic formats.

Interacting with students as learning participants through online learning is crucial when creating new pedagogies. This is allows teachers to use teaching methods that motivate students to learn. Additionally, mobile learning and e-learning encourage students to learn together by decreasing their need for face-to-face interaction. By replacing traditional classroom lessons with blended learning, these strategies aim to improve the quality of training provided.

The teacher can easily:

- Make available to students all the courses in different formats (text, videos, sounds, etc.).
- Evaluate students through MCQs and have an automatic correction.
- Track student progress in real-time.
- Schedule tasks.
- Simplify communication with and between students.

This pedagogical identity is based on the following main principles (Figure 1):

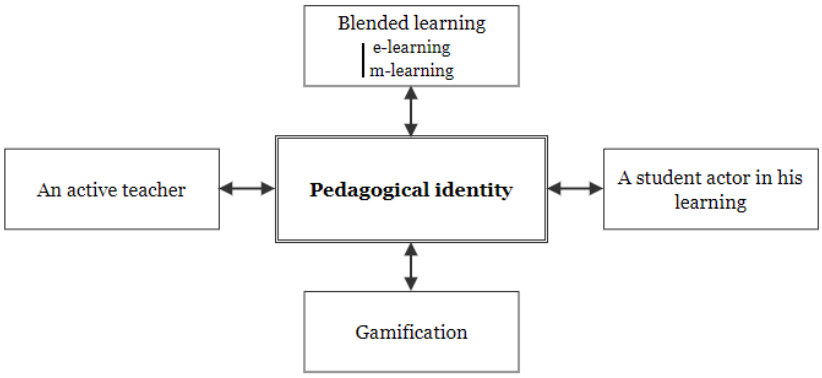

Fig. 1. University pedagogical identity

3.1 A student actor in his learning

The learner is an autonomous and curious student who is accompanied as closely as possible by his university, which provides him with all the necessary tools for comprehensive study. The strong pedagogical orientation in which the student moves from a passive to an active attitude makes it possible to transform the simple transmission of knowledge into real communication and imposes a pedagogical structure aimed at acquiring the skills necessary for students to examine their professional integration.

3.2 An active teacher

Encourage teachers to make massive use of use cases and problem-solving approaches. The following tools are easily integrated into the curriculum and the syllabus of the different courses: *use cases, practical cases, simulation, serious games, role-playing and scenarios, instructional videos, and problem-solving techniques*.

3.3 Blended learning

Blended learning currently emphasizes continuous innovation in pedagogy. Thanks to well-trained teachers, we combine the good practice of teaching tools with teaching objectives and pedagogical diversity within the framework of skills acquisition while achieving a good balance between online learning, on-site deepening of knowledge, and on-site learning for better practice.

Blended learning is based on three key steps to achieve the goal by using the appropriate e-learning platform as the primary medium for work and communication (*lesson plans, forums, and videoconferencing*).

3.4 Gamification

Gamification components provide learning material in the form of simpler interactive games. Interactive games are presented to users based on cognitive behavior that based on an analysis of game-related things such as learning content, personal evaluation scores, perceived intellectual weaknesses, and difficulties in understanding learning materials [23]. Students are guided through the different levels to gain a better understanding of the subject. The complexity of the game levels increases with the knowledge level of the students [24][25].

Some of the most common gamification elements applied to distance learning and learning management systems include grading, earning badges, transitioning to the next level, displaying progress bars, ranking, providing rewards, and facilitating interaction between learners.

4 Conceptual phase

4.1 Statement of the research problem

The digital transformation of educational institutions is the focus of managers. Digital technologies are revolutionizing all processes, expanding the field of education, and increasing the demands whithin students and teachers. Transforming digital into opportunity entails more than simply redefining everyone's mission. This transformation requires new technologies to capture new knowledge and make cognitive investments in current and future issues from a global perspective.

To increase their value, many institutions choose to invest in projects that involve human capital. Projects that involve people in multiple disciplines, as well as collaborations with outside partners and users, are easier to accomplish through digitalization.

Teaching students in a blended approach — one that uses specialized instructional technology and digital educational resources on top of any discipline, goal, or skill — requires constantly embracing each other's professional cultures. This approach is more active than traditional methods and requires long-term mutual promotion.

Analysis of data from the 2021-2022 academic year showed many features and resources weren’t being used out of laziness. Students and teachers alike say they don’t use mobile learning or collaboration tools. Quizzes and videos are the only common resources used with little else employed. This data led to a study of students and teachers to assess their attitudes toward online and mobile learning. The empirical analysis allows students to objectively explore their course material. Making classrooms more inclusive leads to an engaging educational ecosystem. Analysis performed objectively:

- Determine teacher and student satisfaction.
- Identify students with difficulty.
- Monitor their activities and accompany them toward active and continuous use of the tools.

- Explain usage practices, i.e., content transmitted, communications, and collaboration.

Regardless of its novelty, any new form of learning can undoubtedly stimulate a multitude of questions. Consequently, mobile and e-learning must be considered not only as revolutionary teaching methods in full swing but also as additional educational pathways that enhance educational content. E-learning encourages educational diversity through open-ended, multidisciplinary studies and streamlines classroom problems by eliminating face-to-face instruction.

4.2 Research Questions

- What do students think about distance learning?
- What do students think about e-learning and mobile learning?
- What is students' attitude towards e-learning and mobile learning?
- Did they meet their expectations?
- Are they adequately performing their duties?
- What are the strenghts of e-learning and m-learning
- What are their weaknesses?
- What are the barriers to optimal use of them?

4.3 Purpose of the study

The study aims to describe teachers and students' perceptions and attitudes toward the use of educational platforms in e-learning and mobile learning modes. It aims to diagnose the strengths and points of improvement of these learning methods in order to optimize their relevance, usefulness, effectiveness, attractiveness, and feasibility.

5 Methodological approaches

5.1 Methodological phases

To answer the research question and achieve our goals, we followed the steps shown in Table 1.

Table 1. The steps taken during the search

Step N°	Description
1	Our literature research was conducted in meetings with resource persons, project leaders, and collaborators whose goal was to build a database as our reference.
2	• Exploited the usage statistics of online learning platforms 21-22. • Conducted preliminary interviews with a reasoned sample of: – Students in groups of 4 to 5 students per level. – Teachers are interviewed based on their level of education. – Compile the findings of the analysis.

Step N°	Description
3	• Create interview guidelines for teachers. • Prepare the survey for 1st, 2nd, and 3rd graders. • Manage the survey for all relevant populations. • Query, analyze the survey and interpret the results. • Write a report summarizing the findings of the interviews with a sample of students and trainers. • Develop a communication plan and recommendations based on the results obtained.

5.2 Study details

To conduct our survey, we structured the survey details according to Table 2.

Table 2. Details about the survey

Items	Description
Study Environment	Higher Education Context.
Type and level of study	• It is a hybrid exploratory study with quantitative and qualitative components. • It aims to study the perceptions and attitudes of users of online learning platforms and their preferences between the e-Learning and m-Learning training modes.
Study population	The target population consists of: • Target students. • Part-time and permanent teachers who teach targeted students.
Study period	The study took place from May to July 2022.

5.3 Data collection and analysis methods and tools

First, an interview guide was created with a sample of students and teachers, and then participants (teachers as well as first-, second-, and third-year students using the e-learning platform) were provided with a link to the survey for the 2021-2022 academic year) via Microsoft Forms (an electronic survey tool) and the university's learning management system.

Perform data analysis in Microsoft Excel to obtain search results. To analyze the statistics obtained, descriptive statistics based on quantitative and qualitative research methods were used.

5.4 Ethical considerations

Ethics is the set of rules that govern the moral character of the research process. Ethical aspects are of great importance to consider when researching human beings.

Table 3. Ethical considerations details

Items	Description
Respondents' informed consent	We provided survey participants with investigation data to obtain their consent to participate in the research: • Explanation of the purpose of the research. • The modalities of data collection. • The availability to answer all the questions asked. • The declaration that participation is voluntary and any refusal to participate will not result in any sanction, and that at any time the subject may withdraw without consent.
Data Confidentiality	The protocol contains information on how the confidentiality of the data will be preserved (Guarantee the confidentiality of the information and the anonymity of the respondents).

5.5 Limitations of the study

A limitation of the study is that data collection was conducted at a Moroccan university. Also, there were only 198 participants in total, and the study is based only on the 2021-2022 school year and does not include multiple questions to avoid misunderstandings and wrong answers. In the future, empirical research tools will be improved so that similar studies can be carried out at other universities in Morocco. To increase the relevance of the sample, the number of interviewees was increased.

6 Data presentation and analysis

In this section, we will focus on the evaluation results, explaining our evaluation experience and method from different aspects. The sample we surveyed included three levels of students by school year (first grade, second grade, and third grade), including two groups of 32 and 31 students in first grade, two groups of 33 and 32 students in second grade, and only one group of 28 students in third grade. The sample also included 12 part-time teachers and 30 permanent teachers.

All participants in this experiment were science students of different study levels from the same university. Participants were between the ages of 18 and 23. It should be noted that measurements were performed 7 weeks after the initial phase. The figures below show the data extracted from the experiment and the treatment results during the seven-week test period.

Many students carry and use mobile devices frequently, as shown in Figure 2. This information tells us how popular mobile learning could become; over 90% of interviewees said they always use a mobile device, and 80% said they always carry one.

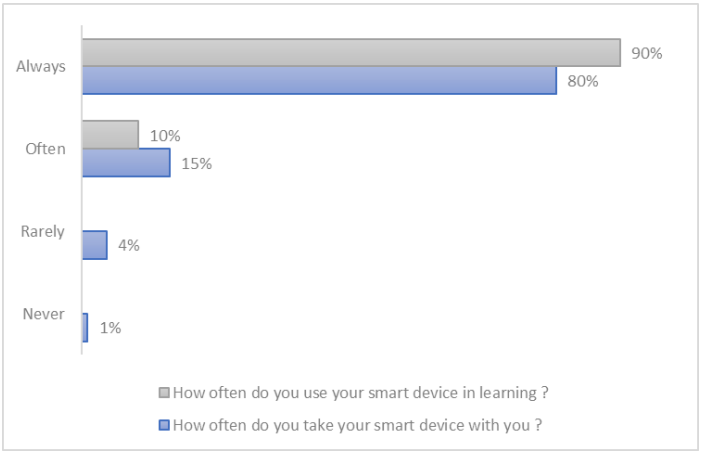

Fig. 2. Student's usage of smart devices

Over 73% of survey interviewees chose to use mobile devices instead of computers. Figure 3 displays the popularity of smartphones over other devices.

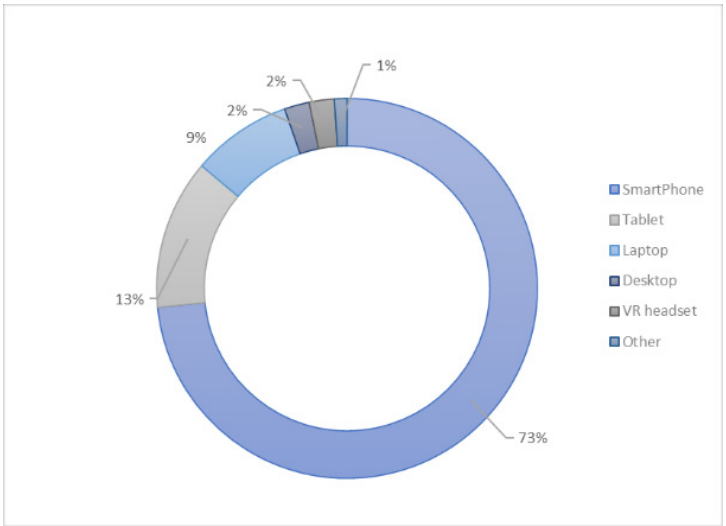

Fig. 3. The student's working environment

As many as 60% of students use mobile technology like smartphones or tablets to interact with their teachers. Additionally, 56% of students use laptops to access educational content online.

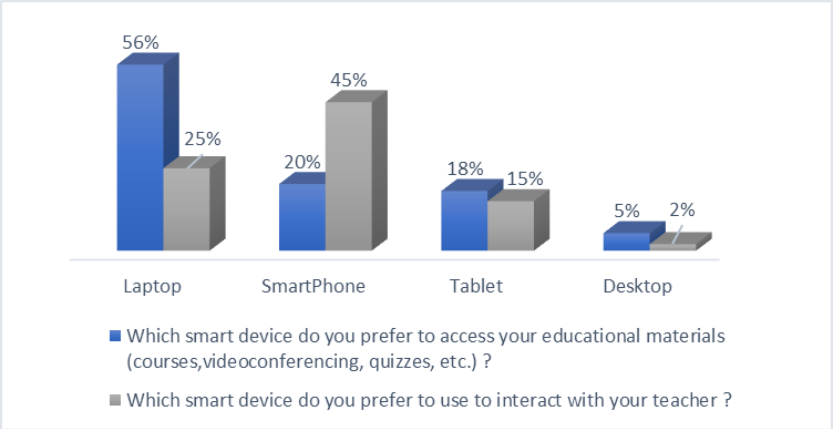

Fig. 4. Students' preferences on the means of accessing educational content and the means of interacting with teachers

91% of trainees consider the hybrid training format to be successful. It combines face-to-face time at the institution with sessions conducted remotely with the trainer. A major reason why students dislike hybrid training is because of network and distance learning issues. Additionally, they have trouble understanding employment management and how to distribute the hourly mass face-to-face and remotely.

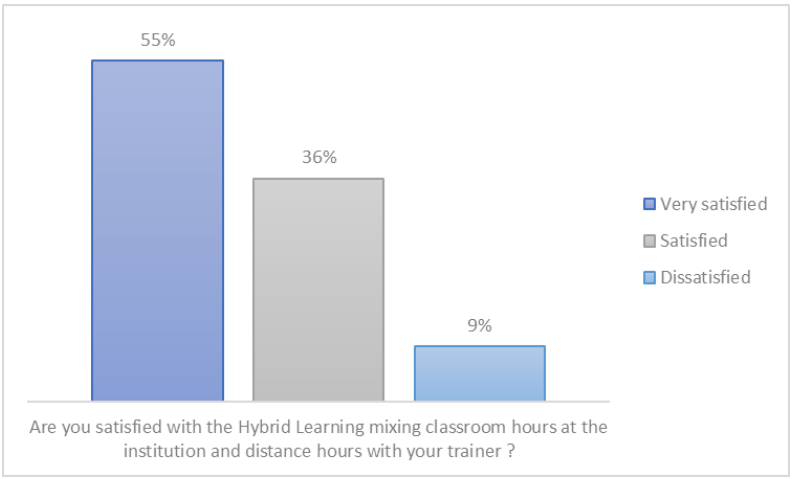

Fig. 5. Student's perspective on Hybrid/Blended learning

Only 7% of trainees are not able to follow the online training session. Additionally, only 23% of students manage to understand the course after completing it, out of the students that occasionally understand the course and nearly half still struggle with understanding.

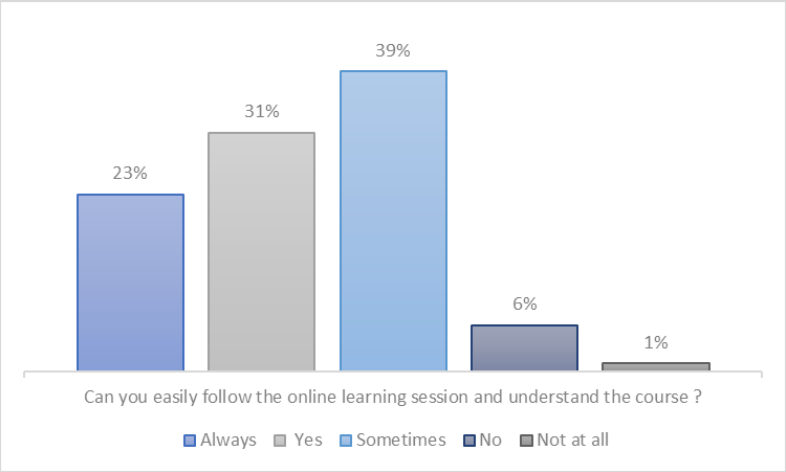

Fig. 6. Student's perspective on their ability to learn and understand online courses

On average, about 5 to 10 hours per week, students spend more than 20% of their time on online training (Figure 7). However, 49% of students dedicate more than 10 hours per week to training.

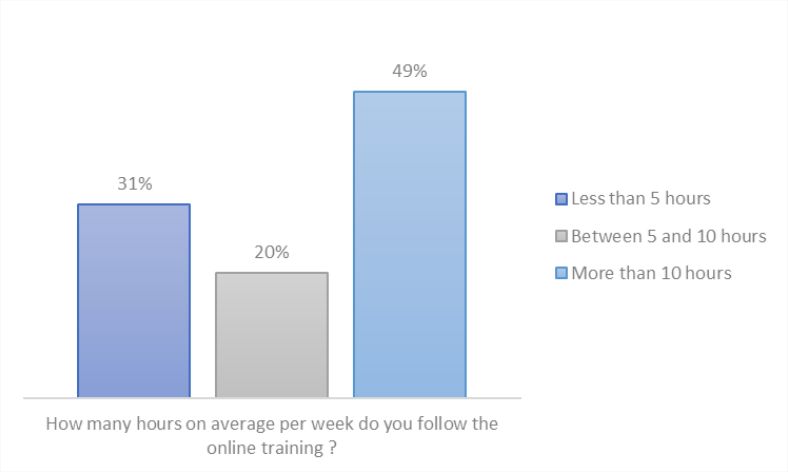

Fig. 7. Average duration spent on online training

Many students noted that they're accustomed to using mobile devices when communicating with teachers. This is because they believe it's more efficient to interact with teachers via handheld devices when discussing technical subjects. As seen in Figure 8, many students expressed this idea.

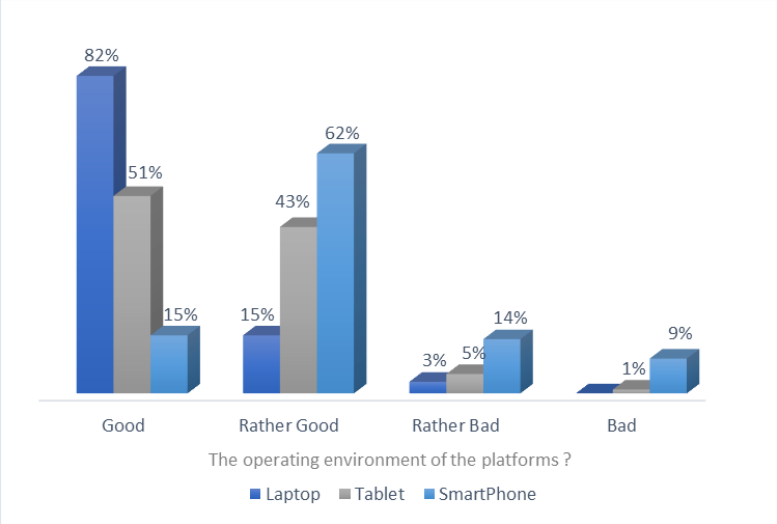

Fig. 8. Student's perspective on the platform's operating environment

Most teachers provide students with lesson content that contains all available information; 78% and 75% of this information is classified into different learning types.

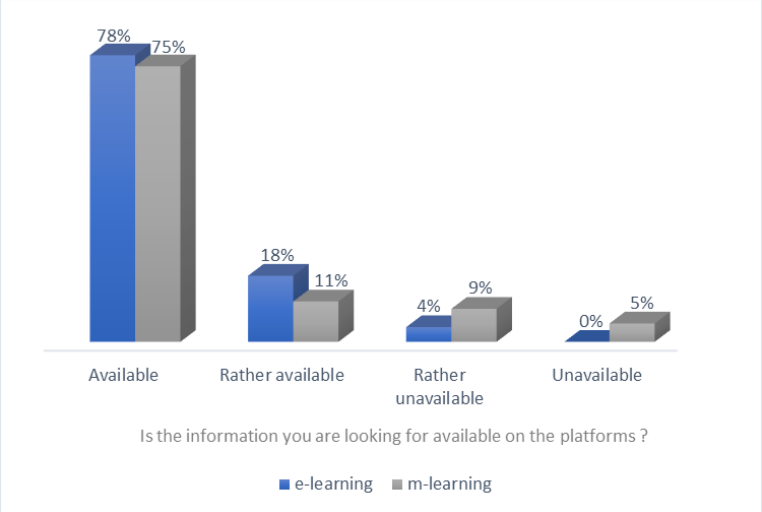

Fig. 9. Student's feedback on the availability of the information sought on the platforms

Students believed that mobile learning platforms were beneficial to their education. This was evident in Figure 10, which showed that most students frequently used these platforms in m-learning mode. Additionally, students' feedback was supported of mobile learning and generally positive.

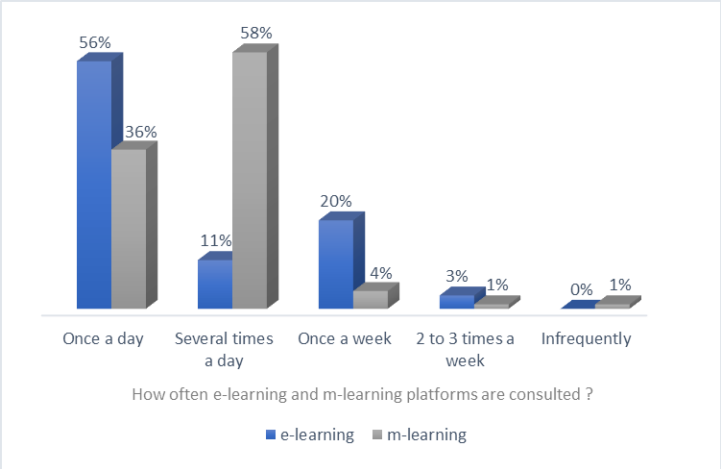

Fig. 10. The student's perspective on the frequency of consultations (e&m-learning)

Figure 11 shows that m-learning has the highest percentage compared to e-learning. The in-depth analysis found that students prefer the m-learning mode to attend videoconferences and submit their assignments; they understand topics clearly and submit assignments fluently and simply.

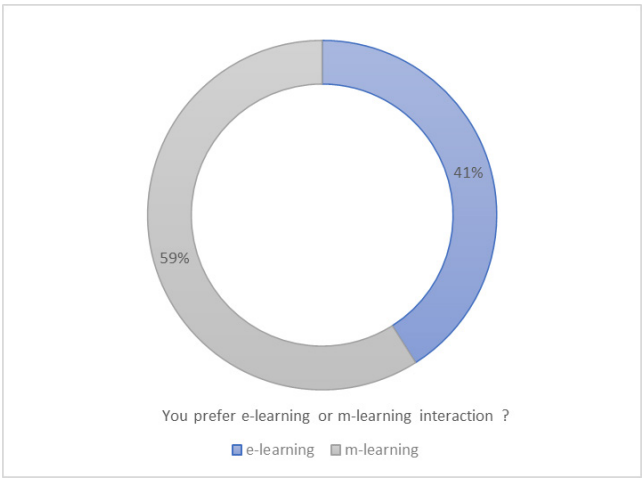

Fig. 11. Student's feedback on e-learning and m-learning interactions

In comparison to other learning methods, students submit assignments with the highest percentage in m-learning mode. Their assignments are clearly understood, and they fluently speak about topics in their chosen course. However, smartphones cause problems when taking assessments online. For example, they can lose connectivity due to 4G or 3G networks wishing to disconnect.

7 Discussion and results

Table 4 summarizes the results of the data for the items common to students and teachers, "survey addressed to students and teachers".

Table 4. Summary of the main findings of what students and teachers have in common

Items	Student answer	Teacher answer
Accessibility	• e-learning: 78% easy access. • m-learning: 47.95% easy access.	• e-learning: 71.43% easy access. • m-learning: 39.29% easy access.
Speed and fluidity to access the learning platform	• e-learning: 63% quick access. • m-learning: 39.73% rather fast access.	• e-learning: 50% rather fast. • m-learning: 32.14% rather fast.
Security	• e-learning: 89.04% secure. • m-learning: 69.86% secure.	• e-learning: 57.14% secure. • m-learning: 42.86% secure.
Home page colors	• e-learning: 76.7 1% good. • m-learning: 58.9 0% good.	• e-learning: 57.14% good. • m-learning: 53.57% good.
Home page policies	• e-learning: 36.99% full-Size. • m-learning: 36.99% small-size.	• e-learning: good 57.14% and normal size 42.86%. • m-learning: good 53.57% and normal size 64.29%.
Assessment	• e-learning: 53.42% good. • m-learning: 57.53% good.	• e-learning: 87.57% good. • m-learning: 53% good.
Purpose and interest	• e-learning: 73.79% achieved. • m-learning: 49.32% achieved.	• e-learning: 71.43% achieved. • m-learning: 46.43 achieved.
Design of Courses	• e-learning: 60.27% simple navigation. • m-learning: 30.14% simple navigation.	• e-learning: 58.94% simple navigation. • m-learning: 36.67% simple navigation.
Interactivity	• e-learning: 38.72% good. • m-learning: 67.12% good.	• e-learning: 41.32% good. • m-learning: 60.14% good.

Table 5 summarizes the results of the data for the student-specific item "survey addressed to students ".

Table 5. Summary of the main results of the student-specific items

Items	e-learning	m-learning
Learning Duration	• 30 to 45 minutes: 45.70%. • < at 30 minutes: 34.30%.	• 30 to 45 minutes: 36.20%. • < at 30 minutes: 46.60%.
Frequency of consultations	• Several times/days: 36.99%. • Once/day: 32.88%.	• Once a week: 19.18%. • Rarely: 32.88%.
Availability of the information sought	• Available: 64.38%. • Somewhat available: 27.40%.	• Available: 44.84%. • Somewhat available: 31.51%.
Ranking resources options	• 1st choice: Course. • 2nd choice: Quiz. • 3rd choice: Links. • 4th choice: Announcement.	• 1st choice: Datasheets. • 2nd choice: videos. • 3rd choice: Illustrations. • 4th choice: Checklists.
Accuracy of the information sought	• Accuracy: 71%. • Rather precise: 22%.	• Accuracy: 42%. • Rather precise: 32%.

Items	e-learning	m-learning
Relevance of the information sought	• Relevant: 66%. • Somewhat relevant: 18%.	• Relevant: 40%. • Somewhat relevant: 29%.
The usefulness of the information sought	• Useful: 78.08%. • Somewhat useful: 15.07%.	• Useful: 50.68%. • Somewhat useful: 24.66%.
Essential points motivating students	• Simple, secure, and personal. • Access to all contents of their training. • Possibility to download content submitted by teachers. • learn at home and with comfort.	• Training accessible anywhere, anytime. • Diversity and richness of content. • Short learning formats. • Dynamic teaching methodologies. • Responsive design leading.
Essential points demotivating students	• Training, support, and follow-up are not insured regularly. • Does not adapt to all materials.	• Real technical constraints. • Lack of internet connection or electricity. • Distraction while learning.

Table 6 summarizes the results of the data for the teacher-specific item "survey addressed to teachers".

Table 6. Summary of the main results of the items specific to teachers

Items	e-learning	m-learning
The frequency of items deposited	• Courses: Always: 64.28%. • Links: Frequently: 39.28%. • Announcements: Rarely: 32.14%. • Quiz: Frequently: 17.86%.	• Courses: Always: 37.86%. • Quiz: Frequently: 14.29%. • Announcements: Frequently: 14.29%. • Links: Rarely: 13.68%.
Relevance of information shared with students	• Relevant: 50%. • Somewhat relevant: 42.86%.	• Relevant: 17.56%. • Somewhat relevant: 21.43%.
Mastery of technical tools to access media	• Yes: 92.86%.	• Yes: 81.14%.
Adapt course content	• Yes: 88.24%.	• Yes: 74.16%.
Track student progress	• Frequently.	• Always.
Platform training	• No: 54%.	• No: 25%.
Boost student engagement in their education	• Always: 29%.	• Always: 68%.
Motivating points for teachers	• Simple and secure platform. • Teach a distance learning course from home. • Reduces face-to-face and motivates students. • Helps students self-assess (online MCQs).	• Training accessible anywhere, anytime. • Diversity and richness of content. • Use content as a basic or complement to procedural knowledge. • Means of self-assessment of students before the exam.
Demotivating points for teachers	• Lack of human contact. • Less interaction. • The lack of appropriate technological equipment.	• Content offered is standard and is not adapted to the learning context of the students. • Distraction of students while learning. • Student access statistics are very low.

Given the similarities between the terms, one might think that mobile learning is nothing more than online learning on mobile devices. However, this isn’t the case.

After a semi-structured interview with a sample, a survey is distributed to the general population via a Microsoft form link. Alongside this, the survey is sent to the participants by e-mail. This is paired with questions from 3 to 5 focus groups per category and level of education.

Tables 4, 5 and 6 provide an overview of the study's overall progress. The students' participation rate is 97.33%, and the teacher's participation rate is 93.68%. The mobile devices students use can be useful in modern education. They can share course information via connectivity and portability, have a wide range of functionalities and be easily carried out. Some devices even have utility and ubiquity, which means they can do many tasks at once.

Students are very satisfied with blended training, with only 23% experiencing problems after completing an online course. Our research shows that 90% of students use mobile devices such as smartphones to study and learn every day. They also used these devices to take their courses for more than 10 hours per week. Another 7% of students reported having difficulties after taking online training. 59% of students surveyed want to conduct online training on their laptops rather than their phones. Smartphones are small enough to fit in a pocket [26]. They fit comfortably in students' hands, allowing them to access a wealth of information with just one finger, which is why 41% of students prefer to use their smartphones for learning. They can also access videos by tapping their fingers, scroll through photos or change pages by swiping. Also, smartphones are less expensive than computers and more effective than tablets when used for online learning because they provide accessibility: smartphones enable mobility (47.95%); interactivity: devices facilitate and improve communication between students and teachers (67.12%); context sensitivity: devices provide real-world data about learners' location, environment, and duration (34.30%); speed and fluidity: devices can be more attractive and easier to access (39.73%); and engagement: devices can increase student engagement in learning (68%).

After analyzing the information gathered from the data, the results obtained proved the strengths of mobile and online training. More than 55% of participants were very unsatisfied with the teaching skills learned through blended learning. Besides, 36% were satisfied with the information they received through e-learning or mobile learning platforms, and 78% were satisfied. The blended training goals were achieved as 75% of students were satisfied with the teaching skills they learned. Additionally, 78% of students felt that the information they learned through e-learning or m-learning met their expectations. Lastly, 86% of students felt that their expectations had been met during m-learning sessions, and 81% during e-learning sessions. This data is derived from a survey of 198 participants. Survey data shows that most students study online courses for more than 10 hours. 49% of students spent more than 10 hours on their course, 5-10 hours, and 11% spent less than 5 hours.

After the experiment ended, the analysis of the survey responses revealed that the participants' objectives were achieved. 88% of participants stated that they were satisfied with how the e-learning was organized. Whereus, 93% of interviewees were very satisfied with the training content and activities. Additionally, over 85% of interviewees said they were satisfied with the tutoring provided by the platform. This indicates

that users continued to engage with the e-learning platform after the experiment indicating a high level of motivation for mobile learning.

The data showed that all teachers were either fully or satisfied with the educational materials they received. In addition, all teachers were satisfied with the way their training was taught by the online trainer. Tables 4 and 6 contain the digital records of 42 teachers who participated in the blended training session. These results indicate that 71.43% of the teachers were accessible to their e-learning courses, while only 39.23% of teachers were able to access their m-learning courses. These strikingly similar percentages to those of the students' responses are consistent with Tables 4 and 5.

From the results in Table 6, it can be seen that most teachers find their online training and content sharing very helpful. They also found their mobile learning abilities helpful, as well as their ability to communicate and collaborate easily. Both students and teachers find the built-in features of online learning impressive. All teachers were trained and communicated with as part of the change management strategy. This impacts their motivation to create online education courses through the platform—especially mobile learning, which helps teachers better connect with students and improve communication between them. Furthermore, the results show that e-learning is often facilitated and enhanced by action.

A large portion of teachers considers mobile learning as an option for their students. They want to use this method if their program has high-tech support. Nearly 97% of teachers consider it an incentive to provide students with distance learning. This method of teaching has increased student engagement by 68%. Nearly two-thirds of the teachers are even motivated to share course content with students in order to benefit them.

8 Conclusion and future works

The evolution of technology requires institutions to constantly improve their educational engineering. New tools and teaching methods create constant pressure on educators to adapt to new environments. This pressure motivates institutions to constantly train future teachers who can change with the times and handle ever-changing technical disciplines.

Our objective was to determine the effectiveness, popularity, and ease of use of both mobile and online learning methods. We examined how each type of learning method impacted its students and teachers. This research provided us with invaluable information regarding the practicalities of each approach to education. Additionally, it gave us insight into each method's most significant limits and challenges. Today’s learners want more than just a certificate— they want to be recognized as individuals, valued for their work, inspired to learn and empowered to build their education. What learners need is a partial e-learning system that helps them achieve these goals. And change is coming: We will soon recognize the student as an individual, value their work in a unique way, and provide them with support in building their knowledge. This transformation happens through mobile and online learning platforms that offer

new methods of education. Formative evaluation can be incorporated into pedagogical lessons to provide transparent educational methods.

The field of mobile learning research is expanding. Other research directions have great potential for mobile learning, such as virtual reality and connected objects, an IoT architecture and new smart learning models are highly recommended. The findings presented in this study may guide future research by researchers, educators, and policymakers on trends in online and mobile learning.

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