

Writing in the Digital Era and AI-Enhanced M-Learning

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Abstract

Globalisation and the rapid development of technology have deeply reshaped our life, and education is no exception. Mobile learning is one of the novel trends the educational pedagogy has recently witnessed. Different educational tools integrate Artificial Intelligence (AI) to enhance its efficiency. In addition, the 21st century learners tend to be skilful using mobile devices. This state of affairs creates more challenges to teachers to meet their students' expectations and to catch up with the evolution of technology. This research paper tries to shed light on teaching writing in the digital era and to highlight the impact of integrating AI-enhanced m-learning in the classroom. It seeks to examine both the positive and negative sides of using AI and mobile devices in learning writing. A quantitative study is conducted to examine students' and teachers' reflections towards the application of m-learning in the classroom and the effects of AI on the students' writing performance. Despite the advantages mobiles devices have, the results revealed some disadvantages that may make teaching writing in the digital era challenging. The study, hence, provides some recommendations to use these tools wisely and cope with the various obstacles both students and teachers can encounter in writing.

Keywords: Artificial intelligence; m-learning; writing; mobile devices.

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I- Introduction:

Globalisation has made the world seem smaller. The use of internet, artificial intelligence and different mobile devices has overcome communication barriers and brought many other benefits in one's lifestyle and education. In essence, using technology has fundamentally changed the way we interact with one another and with society as a whole (Adimabua, 2015). Nevertheless, some disadvantages are unavoidable leading to one question: Are AI-powered mobile devices a blessing or a curse? This study takes into account one important aspect in education, which is teaching writing in the digital age. It attempts to identify teachers' and students' perception towards the use of AI and mobile devices in the classroom. It also intends to spot light on the effects of mobile learning on students' performance and highlight their major advantages and drawbacks. It is then hypothesised that if learners used AI-enhanced mobile learning tools, their writing outputs would improve.

I.1. M-Learning:

Mobile learning or m-learning is simply defined as the use of mobile devices like smartphones and iPads for learning purposes (Heick, 2018). According to Dudeney and Hockly (2007), m-learning stands for the use of an array of technological tools, including cell phones, MP3 players and hand-held computers that may contribute in learning.

Muhammed (2014), for instance, points to the increasingly interest of researchers towards m-learning and its relation to education and the other fields. This is quite understandable and can be explained by the continuous evolution of technology in the world. Ages ago, the only means of education was a book. People used to use books, pens and papers to study. However, with the latest advancements of technology, almost everyone now has a smartphone or a personal computer. These mobile devices have gained a certain popularity and to some extent and have become part of our life. Being significantly enhanced, these devices such as tablets and cell phones are widely available and used (Chartrand, 2016). He further mentions that language teachers, for instance, have been interested in m-learning in order to provide their learners with good learning opportunities and activities (Chartrand, 2016). Sad (2008), on the other hand, asserts that EFL teachers face many problems to deliver their lessons effectively. She mentions some challenges including large class size, inadequate materials, technological support issues and students' lack of motivation. These issues represent some of the reasons behind the implementation of m-learning in the classroom.

Mobile devices have many advantages in learning. Chartrand (2016) states four major advantages of mobile learning: multimedia ability, Internet access, social networking, and immediate feedback. For the first, he explains that the learners' ability to use multimedia in learning can be very

beneficial such as the use of audio and video recordings as a learning tool to compare their performance with native speakers and improve their level. He also mentions listening to music and podcasts in developing the students' listening skills. The internet access enables the learners to get information about different topics instantly to support their knowledge. Social networking sites, such as Facebook, develop the students sharing of information and strengthen the students' connection and interaction. The last advantage is getting immediate feedback from the students' peers and instructor. Students can also participate in polls or surveys in the classroom and get instant statistics, or answer short quizzes or tests and get instant results (Chartrand, 2016).

For learning English as a foreign language, Muhammed (2014) says: M-learning has many advantages for EFL university students when it comes to learning English. One of the advantages could be the possibility to download certain English applications and programs that may help learners to improve their language skills, their language systems like grammar and vocabulary and increase their awareness of such international tests such as TOEFL and IELTS. (Muhammed, 2014, p. 104).

Smartphones, for instance, which are the most commonly used mobile device, are not only used for communication through phone calls or texting. They have other benefits that have changed our life and made it easier and more practical. Some of these functions are: playing games, mobile banking, finding locations by GPS, preparing presentations, calculations, taking photos and videos, sending emails, listening to music and radio, storing numbers and different files, addresses, notes and reminders. They can transform into a calendar, torch or an alarm clock as well (Singh, Gupta, & Garg, 2013).

Harriman (2018) in his turn, states some of the advantages of cell phones in the classroom. He emphasises on the importance of ensuring correct use of cell phones in the classroom. He further mentions other utilities of cell phones in the classroom such as using them as a participation tool, an organisational tool and as a resource in the classroom. This mainly involve the use of notes, dictionaries and other mobile apps for learning grammar, vocabulary, pronunciation, etc. (Harriman, 2018).

Mobile devices have also numerous disadvantages that should not be neglected. Chartrand (2016) stresses out some of them. He first highlights the greatest issue concerning using mobile devices which is being a source of distraction. Students may use these devices inappropriately such as watching videos and playing games that are not related to the lesson. Being connected in social networks during class time just for chatting or having fun with friends is another problem.

Cheating is another common disadvantage of using mobile devices in the classroom, especially smartphones, Mp3 players or iPods. These tools are small and can be hidden easily from teachers, especially during tests. Chartrand (2016), in this regard, states that using dictionaries and internet to

find answers in a test or quiz is academically unacceptable and hard to be observed. As these tools are usually enhanced with AI support, students may get complete answers from AI tools like chatbots. ChatGpt is a famous example of AI chatbots, and it gives students full and instant answers to all their questions.

Disconnection is another serious shortcoming of m-learning. The students may end up working individually relying only on their devices instead of working in groups and develop their sense of collaboration and sharing which is highly encouraged in the classroom. In addition to these shortcomings, some technical problems may arise during classes such as network connection failure and hardware or software inactivity. These problems are time consuming and disturbing in the classroom (Chartrand, 2016).

Mobile phones, as an illustration, have plenty of disadvantages too. Radiations emitted from them are linked or responsible for many diseases such as hearing loss, skin diseases, and cancer. The overuse or the misuse of mobile phones may lead to some psychosomatic disorders affecting one's personality (Singh, Gupta, & Garg, 2013). "There are advantages and disadvantages for each new technology and so is true for mobile phones too, it depends on how we use it" (Singh, Gupta, & Garg, 2013, p. 197). This advocates the appropriate use of any new technology and getting what is best from it without having many bad consequences on one's academic performance and health. Adimabua (2015) clearly puts that technology is quite beneficial to mankind in moderation. In other words, excessive use of technology, particularly internet, may cause all sorts of issues. Thus, the best way to prevent these problems is monitoring and moderating how these tools are used, particularly among young people.

I.2. Artificial Intelligence (AI)

Artificial intelligence (AI) is a field of computer sciences that enables machines to learn, reason, and act autonomously, often inspired by human cognitive processes (Stone et al., 2016). In other words, it imitates human intelligence using computers in order to perform tasks that typically need human thought and decision-making. In the same vein, Ghareeb (2020) states that AI is a multidisciplinary field that focuses on enabling computers to replicate human intelligence in various tasks. It is crucial in the classroom for developing listening and speaking skills, as it enables quick assessments and updates.

The integration of AI in the classroom is crucial for enhancing learners' skills, particularly when combined with mobile learning (m-learning). AI provides personalised learning experiences, allowing students to develop their level while receiving immediate feedback and support. This not only improves their proficiency but also fosters a more engaging and motivational learning environment. Both m-learning and AI represent fields of the future, and their integration into education is highly beneficial,

offering innovative ways to meet the diverse needs of learners and prepare them for future challenges (Todino, Giuseppe and Kidiambo, 2022).

Universities must rethink their roles and pedagogical models in relation to AI, recognising the vast opportunities and challenges it presents. AI solutions can enhance inclusive education and lifelong learning while preserving the core values of higher education (Popenici & Kerr, 2017). In other terms, despite the disadvantages AI tools have, educational systems must seriously consider their integration in education. Nevertheless, this integration should not ignore the importance of learners’ autonomy and creativity. Combining m-learning and AI is one of the efficient features that make the process of teaching and learning easier. The following figure displays the aspects of AI-enhanced m learning.

Fig. 1. Attributes, Functionalities, Learning Principles and AI Amplification of M-Learning

Attributes	Immediate availability	Ubiquity	Connectivity and interactivity
Functionalities	 • Autonomy • Flexibility and adaptability • Permanence • Instantaneity • Personalization and inclusion	 • Contextuality • Situationality • Informality and motivation	 • Sociability • Collaboration and cooperation • Feedback
7 Learning principles (Dumont et al., 2010)	• Learners at the centre. • Recognising individual differences • Stretching the results	• Building horizontal connections	• Social nature of learning • Assessment for learning • Emotions are integral to learning.
AI Amplification	• Personalized learning • Adaptive learning.	• Mobile augmented reality • Mobile virtual reality	• Intelligent tutoring systems • Facial expression recognition • Voice recognition

Source: Moya & Camacho, 2024, p.8

In brief, to effectively incorporate AI in the classroom, educational institutions should put into account many aspects such as ethics, privacy, efficient training programmes and solid partners for future collaborations (Al-Zahrani & Alasmari, 2024). They should consider AI pros and cons in m-learning contexts in order to enhance their educational materials and improve the learners’ skills.

II- Method:

In this study 103 EFL students from the department of English, University Frères Mentouri Constantine 1 have participated in a short online questionnaire to identify their opinion about the use of mobile devices in the classroom. 20 EFL teachers from the same university have also participated in a short online questionnaire in order to determine their point of view about integrating m-learning in their classes. As informants tend to skip questions and avoid answering questionnaires that are long and time consuming, the used questionnaires are precise and concise. This research paper focuses also on the effects of AI-enhanced m-learning on the students’ writing achievement. Therefore, a group of 15 first year students of Biotechnology enrolled in English course participated in a pre/posttest experiment.

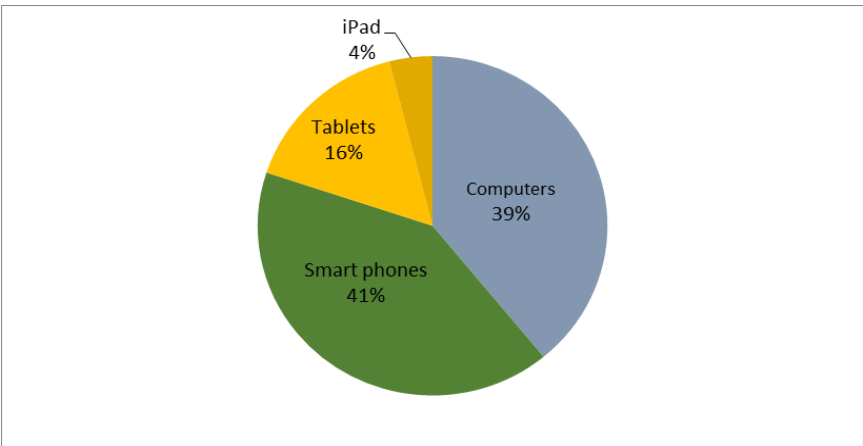
III- Results and Discussion:

In this section, a descriptive analysis of the gleaned data is displayed. The analysis is achieved using a statistical programme, the SPSS (20.0.0 version).

III.1. Student Questionnaire:

The students’ opinion about using mobile devices is displayed in the form of graphs. Each graph represents the respondents’ answers in the questionnaires. The first item is about the mobile devices that are commonly used by the participants.

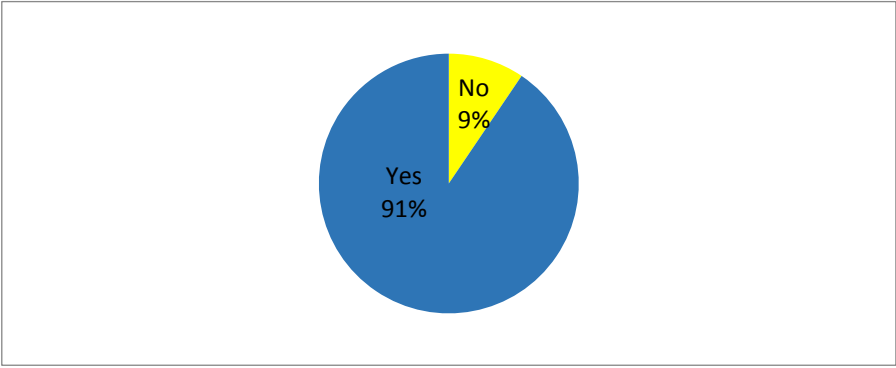
Fig. 2. The Mobile Devices Students Usually Use



As can be seen in Figure 2, the majority of the respondents (41%) use their phones. Almost equally, i.e. 39% of the respondents use their computers. Some of them (16%) use tablets, whereas only few (4%) use iPads. This can be explained by the easy and quick access to the phones. They can use them anywhere and anytime. Besides, smartphones nowadays have many interesting options and applications for learning purposes and for daily life. This explains why they are the most commonly used ones. Computers, on the other hand, have similar options especially for learning purposes. The other devices, nonetheless, are less commonly used. This can be due to their costs and limited options.

The second item in the questionnaire is about the use of mobile devices inside the classroom. The students were asked whether they use or not these devices in the classroom. The obtained results are shown in Figure 3.

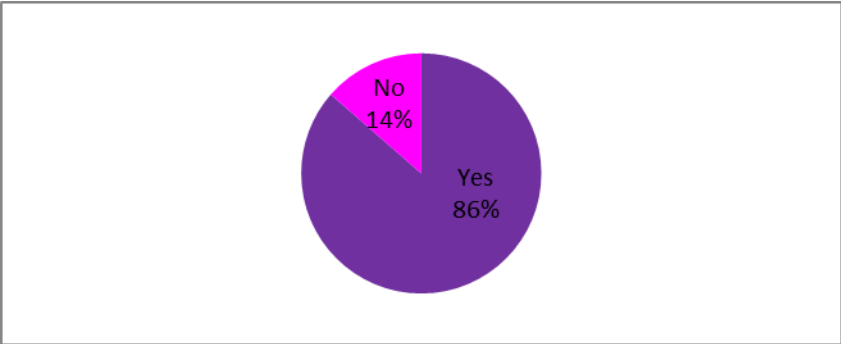
Fig. 3: Using AI on Mobile Devices in the Classroom



A glance at Figure 3 shows that the overwhelming majority of the respondents (91%) declared that they use artificial intelligence on mobile devices (phones, tablets, computers, etc.) inside the classroom. The remaining few respondents (9%) affirmed they do not use any mobile devices in the classroom. Simply put, the 21st century learners are living in a digital era, on which digital devices are more used. They tend to use these elements everywhere including the classroom. In some situations, it seems a bit scary as nowadays learners are more addicted to their devices and rely a lot on AI in doing different activities.

The third item in this questionnaire is more specific. It seeks to determine if the respondents use AI and mobile devices for learning purposes. The obtained results are represented in the following figure.

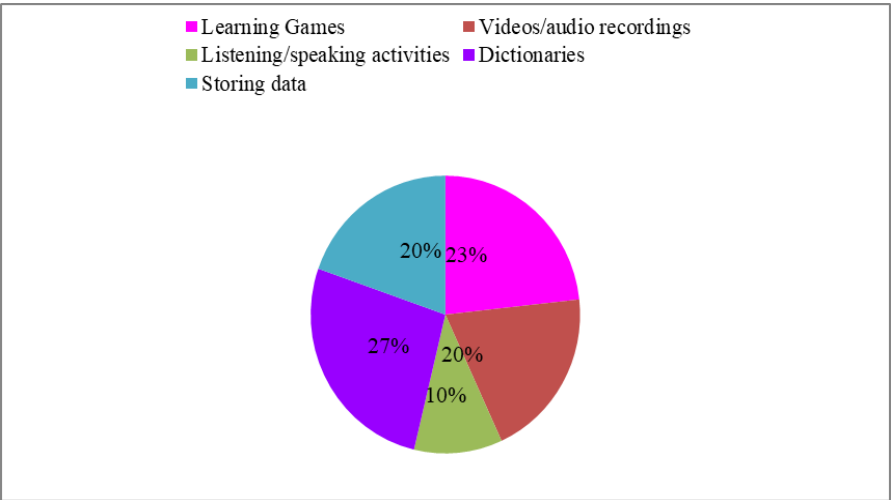
Fig. 4: Using Mobile Devices for Learning



Considering the results displayed in Figure 4, one may assert that the greatest majority of the respondents (86%) deploy AI and mobile devices for learning purposes. However, some of the respondents (14%) do not use them for learning. Interestingly this suggests that the majority of the subjects use these devices for learning, whether inside or outside the classroom. This is quite satisfying as they benefit more from these tools while studying.

The next item attempts to identify the different uses of mobile devices. The question suggests different options for the respondents. Their selected choices are graphically displayed as follows

Fig. 5: Applications of Mobile Devices in Learning

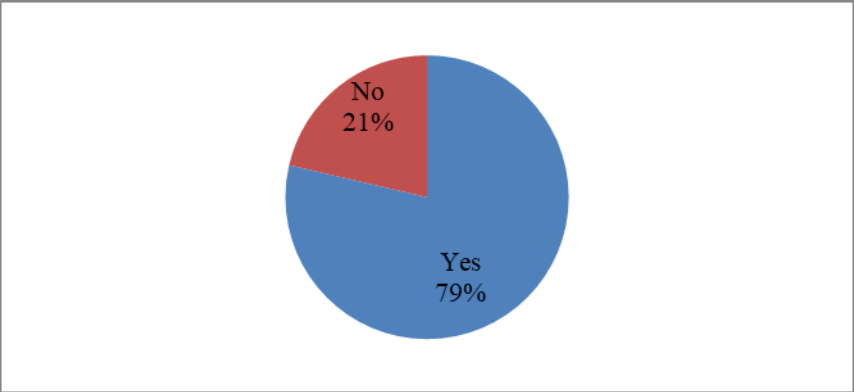


In their answers to this question, the respondents diverged sharply. For instance, 27% of the respondents use dictionaries on their mobile devices, particularly phones. 23% of them prefer to play learning games on

their mobile devices. This is a smart way to learn and have fun. It can be noticed that 20% of the respondents use mobile devices for storage and a similar percentage use them for videos and audio recordings. Storing data in the form of pictures, files, videos or audios is very important for the learners to have resources that can be checked anytime. The remaining respondents (10%), argued that they use listening and speaking applications on their mobile devices, particularly phones. Despite the divergence in the obtained data, it is good that the respondents tend to use various applications on their mobile devices for learning purposes. This divergence can be explained by the difference of the learners' needs. Therefore, each learner selects what they need more to focus on, regarding their weaknesses.

Tackling the effects of AI powered mobile devices on the learners' performance, the next item tries to determine the respondents' views of the impact of using mobile devices on their level.

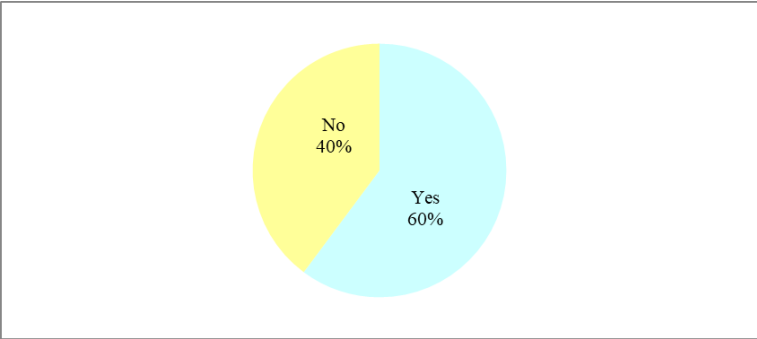
Fig. 6: Improving the Students' Level via AI-Powered Mobile Devices



The data retrieved from the respondents' answers to this question in particular show that the majority (79%) believed that AI tools used on their mobile devices play a significant role in improving their level. Yet, 21% thought that they do not have any effect on their level. In the light of the obtained results, one may think that many of the respondents argued that mobile devices and AI applications helped them to improve their level because they used them wisely and, more importantly, for learning purposes.

More specifically, the following item is about the possibility of using AI-enhanced mobile devices in the classroom. The question is straightforward and asked to know if these students are allowed to use AI and mobile devices in the classroom or not. The gleaned data for this question is shown in Figure 7.

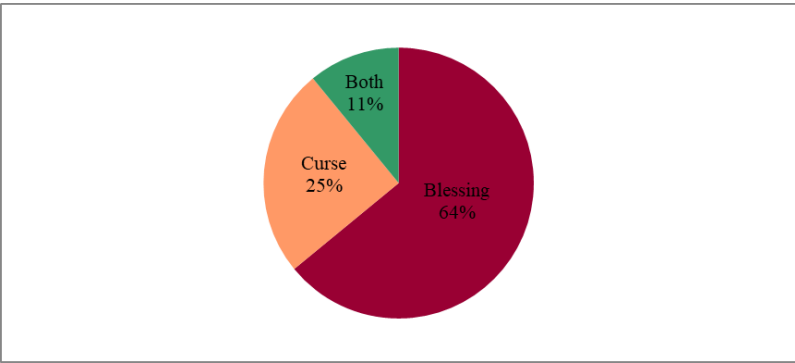
Fig. 7: Allowing AI-Enhanced Mobile Devices in the Classroom



As mentioned in Figure 7, the biggest number of the respondents (60%) argued that they are allowed to use mobile devices in the classroom. However, 40% of the respondents asserted they are not allowed. This explains that some teachers allow their students to use mobile devices and AI for learning purposes, while others prefer not to in order to avoid students’ distraction and overreliance on technology.

A final question is sought in order to highlight the students’ perception of using AI-powered mobile devices. This question serves one of the current research paper aims. The respondents’ obtained answers are displayed in the following figure.

Fig. 8: Students’ Perception of AI-Powered Mobile Devices



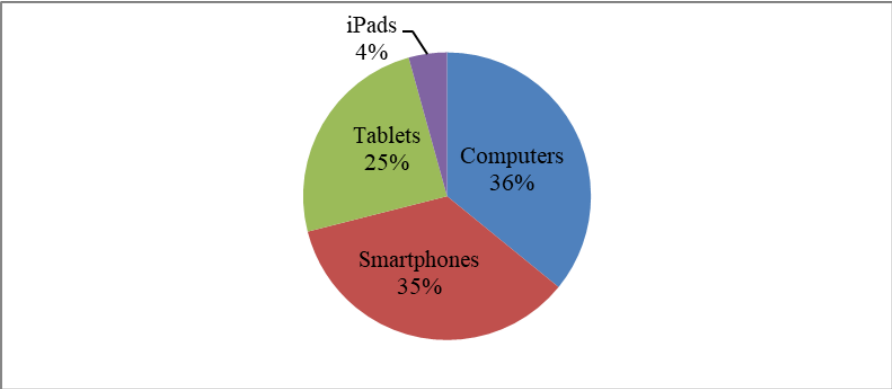
A glance at the previous graph reveals that the overwhelming majority of students believe that the use of AI on mobile devices is beneficial. Many of the participants use them for learning as aiding tools and believe that they are contributing in developing their level of understanding. This explains why the majority of the respondents (64%) claimed that these devices are a blessing. On the contrary, 25% of the respondents argued that they are a curse. This suggests that these students

tend to be more distracted and negatively influenced by mobile devices or rely a lot on AI support, affecting their real level. The remaining respondents (11%) believed that they are both a blessing and a curse.

III.2. Teacher Questionnaire:

In this section, the obtained data from the teachers’ responses are also displayed in form of graphs. The questions are used in order to highlight the teachers’ perception and attitudes towards using AI and m-learning in the classroom. The first question is asked to determine the mobile devices commonly used by the teachers. The obtained results are shown in Figure 9.

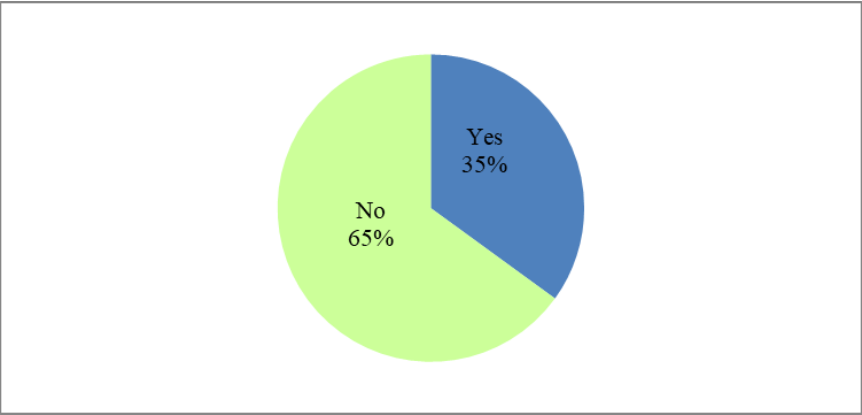
Fig. 9: The Mobile Devices Teachers Usually Use



According to the obtained results, the teachers use several mobile devices just like the students. For instance, 36% of the teachers use computers and 35% prefer to use smartphones. Some of them (25%) use tablets and only few (4%) use iPads. This can be explained by their familiarity with the devices.

The second question is devised primarily to reveal if the teachers themselves use mobile devices for teaching purposes. The gleaned data from the teachers’ answers to this question is displayed in the following figure.

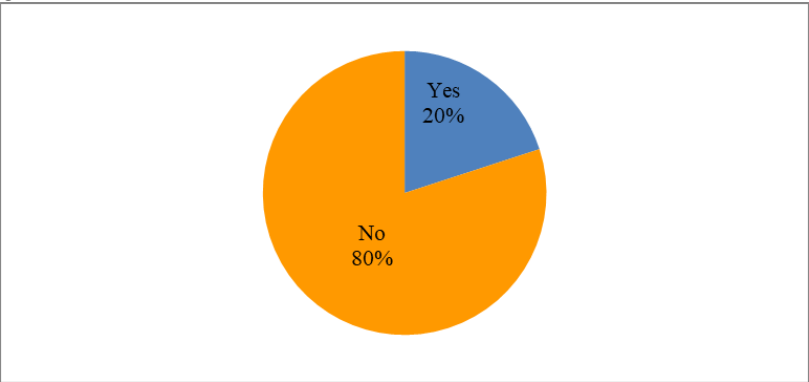
Fig. 10: The Use of Mobile Devices in Teaching



According to the obtained results, the majority of the teachers (65%) use mobile devices for teaching purposes. However, the remaining teachers (35%) argued that they do not use them at all. These teachers prefer the old way of teaching and feel more at ease without using them. The results can also be interpreted by the teachers’ unfamiliarity with the latest mobile devices.

A similar question is asked to the students. This question seeks to highlight the teachers’ attitudes towards the students using mobile devices and AI in the classroom.

Fig. 11: Allowing Students to Use AI on Mobile Devices in the Classroom



It is quite noticeable that the greatest majority of the teachers (80%) do not allow their students to use mobile devices in the classroom, while few of them (20%) do. Simply put, these teachers prevent students from using mobile devices in the classroom as far as they are not used for learning. As a matter of fact, many students use mobile devices, particularly phones for calling, texting, chatting, etc. This is unacceptable for most of the

teachers. Therefore, they prefer to limit the allowance of using mobile devices in the classroom.

The next question’s aim is to get the teachers’ own reflection about the level of the students who use mobile devices for learning purposes.

Fig. 12: Improving Students’ Level

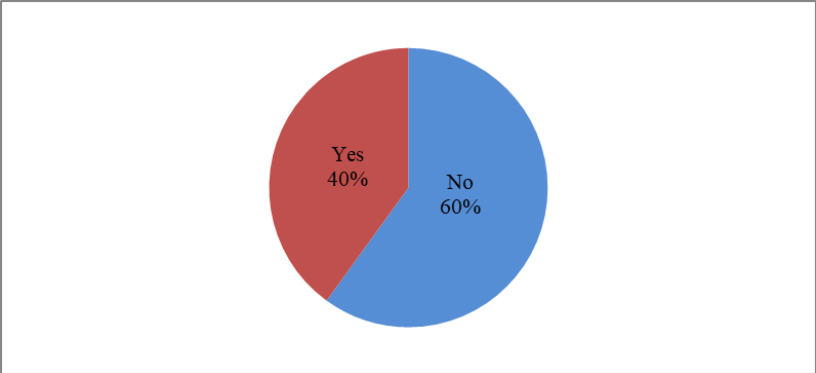
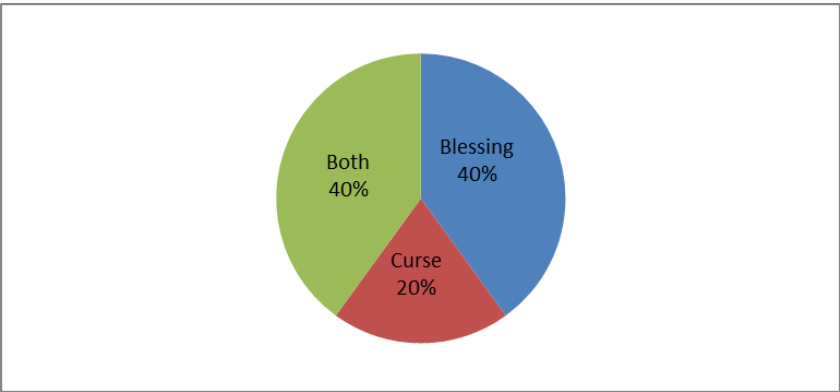


Figure 12 shows that many of the teachers (60%) believe that the level of their students is not improved because of the use of mobile devices. These teachers are also the ones who prohibit the use of mobile devices in the classroom. Nonetheless, 40% of the teachers viewed the positive impact of mobile devices on their students’ level. This can be explained by the teachers’ guidance which helps the students use efficiently mobile devices for learning.

Again, a similar question is asked to the teachers to get information about their opinion about AI enhanced mobile devices for being a blessing, a curse, or both. The gathered data is graphically represented in Figure 13.

Fig. 13: Teachers' Perception about AI-Powered Mobile Devices



A glance at the previous graph shows that most of the teachers do not agree with the students’ opinion about AI and mobile devices. Even though the greatest majority of the teachers use mobile devices, but they do

not use them for teaching purposes. They believe that the use of mobile devices should be prohibited in the classroom because they represent a source of distraction to their students. Students tend to use these devices for other inappropriate activities instead of focusing on the lesson’s objectives and tasks. Therefore, 40% of the teachers claimed that mobile devices can be both a blessing and a curse, and 20% of them believed they are a curse. The remaining teachers (40%) thought that AI-enhanced mobile devices are a blessing and can be used for teaching and learning purposes, with many advantages for both the teachers and the students.

III.3. Students’ Writing Test:

As previously stated, in order to investigate the effects of using mobile devices on students’ achievement in writing, a pre-test/post-test experiment was carried out. The participants were asked to write a descriptive paragraph before and after the integration of m-learning and the use of AI assistance in the classroom. The students’ obtained scores, which are out of 20, in both tests are shown in the following table:

Table 1: Students’ scores in the Pre-test and the Post-test

Student	Pre-test scores	Post-test scores
1	7	12
2	6,5	10
3	12	12,5
4	10	14
5	8	10
6	9	13
7	4	8
8	3,75	9,5
9	8	7
10	7	7
11	6,25	7,5
12	5,5	10
13	5	10,25
14	9	12
15	10	13,75

The SPSS statistical programme was used to compare means and to report the standard deviation in the participants’ scores. Table 2 shows the descriptive statistics obtained in this experiment. It shows that the mean in

the pre-test is 7.4 while it is 10.43 in the post-test. This means that there is a

Table 2: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
air 1	Pre-test scores	7,4000	15	2,34863	,60641
	Pst-test scores	10,4333	15	2,37635	,61357

huge difference between the subjects’ scores in the pre-test and the post-test.

Statistically speaking, Table 3 indicates that there is a significant difference between the participants’ obtained results in the pre-test and the post-test. This is explained based on the obtained mean (-3.033) and the obtained p-value (0.00).

Table 3: Paired Samples Test

		Paired Differences		Sig. (2-tailed)
		Mean	Std. Deviation	
air 1	Pre-test scores - Post-test scores	-3,03333	2,03072	,000

These results lead to conclude that the integration of AI-enhanced m-learning in the classroom is very beneficial in developing the students’ writing outputs. It is worth mentioning that m-learning can be used in teaching English language in a more general term, and not exclusively in developing the learners’ writing skills. However, for writing, AI can be considered as a double-edged sword as it supports the learners in improving their writing performance, but can also affects their style and creativity. It may lead to an overreliance on these technologies, instead of using them as aiding tools. In other words, learners may ask AI tools to write their essays for them instead of using them for brainstorming and outlining as it was in the experiment.

Regarding the obtained results, teachers should reconsider the use of mobile devices in the classroom. They should set rules in the classroom to prevent students from confusion and distraction. Moreover, teaching English and particularly writing in this digital age should consider the implementation of various technologies to meet the 21st century learner’s expectations and to keep up with the technology continuous development.

IV- Conclusion:

AI and Mobile devices can be a curse sometimes, especially when they became a source of distraction for learning and even in daily life

activities. They are also harmful to our health (vision, cardiovascular problems, cancer, and depression). Our role as teachers is to guide these novice students and young users to learn how to use these mobile devices reasonably and more effectively. The major findings obtained in this paper go in line with a research paper written by Muhammed (2014) in which he highlighted the effectiveness of using m-learning in ELT. Therefore, this paper highly recommends the integration of m-learning in ELT syllabus. In other words, designers can adjust their syllabi with units on which the use of mobile devices is recommended. This helps the teachers and the students to use mobile devices effectively. Moreover, mobile devices are needed for distance learning. They have many advantages, which makes learning how to use these devices very important nowadays, and a must in the coming years. Integrating technology into EFL teaching is vital for creating a motivating learning environment. AI, for example, can provide effective models for pronunciation and combine writing skills with oral activities for better results (Ghareeb, 2020).

AI-based mobile learning platforms offer more learning opportunities and making learning activities flexible, accessible anytime and anywhere. This approach reduces students' anxiety, enhances their enjoyment and confidence, and boosts their intrinsic motivation, leading to better performance (Arini, Hidayat, Winarti, & Rosalina, 2022). In short, further research should focus on redefining teachers' roles and developing new learning pathways for higher education putting into consideration the aspects that are challenging for machines to replicate such as imagination and creativity (Popenici & Kerr, 2017).

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