

Impact of Mobile Technology and AI on the Learning Styles of Young Adult Algerian EFL Students; The Case of EFL L1 Students at ENS Djelfa in Algeria

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Abstract:

Mobile technology is widely present in the young adults' daily lives. They commonly use this dynamic technology to perform different activities, tasks, or leisure pursuits. This paper aims at presenting English as Foreign Language (EFL) students' learning preferences related to technology in order to map a direction for designing new learning systems supported by artificial intelligence (AI) tools that can fully apply to mobile technology and which can serve as a mobile pedagogical tool. The study uses a mixed method research to investigate the effects of mobile technologies and AI on students' learning styles by exploring the correlation between the students' learning styles and their use of mobile technology through a structured questionnaire and an interview. The questionnaire results are compared to the interview outcomes for triangulation. The findings reveal a strong relationship between the learning styles and mobile technology which effectively participates in shaping their learning process. The findings' implications emphasize mobile technology significance in the pedagogical process and recommend the necessity of integrating mobile learning systems empowered by AI tools in the Algerian University.

Keywords: Artificial Intelligence; mobile technology; learning styles; learning systems; Young Adult Algerian EFL students.

1- Introduction

The rapid advancement of technology in the 21st century affected almost all aspects of personal and professional fields. Algerian higher education has integrated various pedagogical techniques based on technology to foster the teaching-learning process. For instance, technology offered many facilities and tools to help effective teaching when conventional classroom instruction was impossible; as in 2020 when Covid 19 hit the world (Buddha et al., 2024). Accordingly, technology-enhanced education gained popularity when it saved the situation during the pandemic period (Buddha et al., 2024). Technology-assisted language learning witnesses a rapid development of tools that are not only meant to transmit knowledge but also enhance the needed skills. Learning, thus, has

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become innovative, dynamic, and learner-centered (Barokah et al., 2025). Technology offered various digital tools to support pedagogy (Sharma et al., 2017).

In higher education, many technologies are used to assist and support the teaching process such as blended learning, project-based learning, virtual reality and mobile applications (Peñafiel et al., 2016). Most of these supportive technologies are based on learning management systems, also known as e-learning platforms. To access lessons on these platforms, students need computers and laptops, which is not practical to all students. Students need to check the e-learning platform anytime and anywhere. According to James W. B., Gardner D. L. (1995), technology should effectively support learning and learners. Distance learning designers should consider adults' learning styles, preferences, and the different learning contexts (Verduin & Clark, 1991). Hence, respecting the different adults' learning styles will certainly enhance distance learning effectiveness (James W. B., Gardner D. L., 1995).

In order to identify the influence of mobile technology and AI on students' learning styles, two research questions raise in this study:

1. What is the impact of mobile technology use on EFL students' learning styles?
2. What is the impact of AI use on EFL students' learning styles?

The following section provides an understanding of the variables studied in this paper.

1– Review of Literature

2.1– Students' Learning Styles

'Learning styles' is a broad term that includes the concept of cognitive style (Tuan, 2011). Before the use of the term 'learning styles', cognitive style was used to refer to learners' preferences and needs (Swanson, 1995). A learning style is a student's consistent way of responding to and using stimuli in the context of learning (Claxton & Ralston, 1978) as cited in (Gulnara Gorgiladze, 2024). Another definition of learning styles stated by (Scarpaci & Fradd, 1985) describes them as the different manners of learners' perception, organization, and information recalling in their contexts. Keefe (1987) defines learning styles as the "cognitive, affective, and psychological traits that are relatively stable indicators of how learners perceive, interact with, and respond to the learning environment". According to the different definitions, it is noticeable that researchers agree that individuals learn differently, and each individual has personal ways to learn better and achieve the desirable learning outcomes.

The variety of learning styles is influenced by many factors such as age, gender, environment, and contextual interaction (Keefe, 1987). Dunn & Dunn, (1979)

mentioned 18 elements that shape the learners traits and characterize their learning styles. These elements are divided into four categories: environmental elements, emotional elements, sociological elements, and physical elements (Dunn & Dunn, 1979). They also studied the teaching styles that are compatible with the different learning styles. They state that when the learners are taught in a way that is compatible with their learning styles, they will be able to master the different materials (Dunn & Dunn, 1979). Hawk & Shah (2007) state another stimuli category in addition to the previous four categories. This fifth category is the psychological stimuli. As a result, learning styles are of a great significance in language learning process (Yassin & Almasri, 2015).

2.1.1– Learning Styles Categories

Learning styles can be classified into three major categories: cognitive learning styles, sensory learning styles, and personality learning styles (Reid, 1987). Each one presents different characteristics of learners. First, the cognitive learning styles are identified as the way a person perceives, thinks and solves problems. They are divided into field-independent vs. field-dependent learners; Analytic vs. Global learners; Reflective vs. Impulsive learners (Tuan, 2011). Second, sensory learning styles are biological and related to the reactions that may appear because of the learning environment (Mehrpour & Motlagh, 2015). They are divided into Perceptual Learning Style such as visual, auditory and kinesthetic; and Environmental Learning Style including physical learners and sociological learners. Third, personality learning styles are associated with the sentimental features of the learners (Mehrpour & Motlagh, 2015). They are classified to extroverted vs. introverted; intuitive-random vs. sensing-sequential; thinking vs. feeling; and closure-oriented/judging vs. open/perceiving, an ambiguity Tolerant vs. ambiguity intolerant, and a left brained learner vs. a right brained learner (Mehrpour & Motlagh, 2015).

2.2– Mobile Assisted Language Learning (MALL)

Mobile technology is largely influencing learning since it is widely present in learners' daily lives and activities (Miangah, 2012). The effective use of mobile technology helps learners' engagement as central actors in the learning process. According to Klopfer et al., (2002), mobile technology offers advantageous features that lead to its spreading. They highlight the following characteristics: portability, context sensitivity, social interactivity, connectivity, and individuality (Klopfer et al., 2002). Mobile technology effectiveness in second language acquisition is mainly measured through learners' perceptions and attitudes to this technology (Viberg & Grönlund, 2012). The following figure illustrates artificial intelligence extension in mobile learning (mLearning) as well as learning standards.

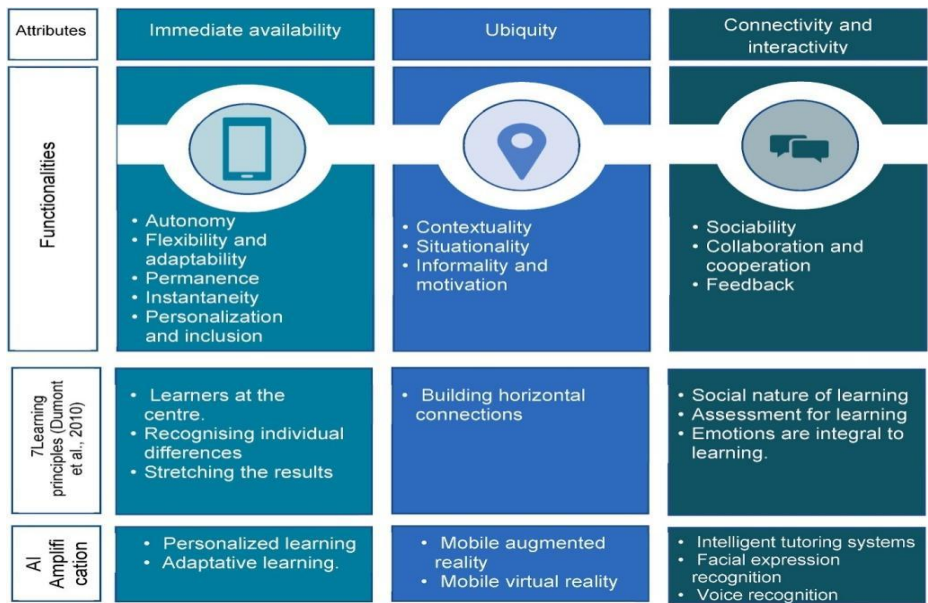


Figure (2): Attributes, functionalities, learning principles and AI amplification of mLearning

Source: Moya & Camacho (2024)

The main functions attributed to mobile technology by its users are:

'autonomy, flexibility, adaptability, permanence, instantaneity, personalization, and inclusivity; contextualization, situationality, informality, collaboration and cooperation, socialization, and feedback' (Moya & Camacho, 2024).

Although there is no specific conceptualized definition of mobile technology language learning, a lot of papers are devoted to studying its impact on vocabulary learning, listening, and speaking (Viberg & Grönlund, 2012). The authors argue that there is lack of interest in combining learning styles and mobile technology as stated in the following quote.

Very little attention is devoted to individuals' language learning strategies and learning styles when employing mobile devices for their language learning. This knowledge can have a crucial impact on both educators, when for example designing language learning activities adopting mobile devices (development of new applications and intelligent tutorial systems for mobile devices for language learners) and learners, as they can achieve higher proficiency (Viberg & Grönlund, 2012).

The combination of institutional structured learning management systems and the mobile technology flexibility can provide an authentic context that supports language learning in higher education. Mobile technology provides personalized learning context

which matches learners' learning styles (Bidarra & Sousa, 2020). For instance, English language teachers can integrate mobile phones in their pedagogy to enhance learners' pronunciation (Saran et al., 2009). Alehegn & Mentor, (2019) introduce the terms 'democratic education' and 'civic engagement' through the integration of smart phones in the learning process. Moreover, mobile technology supports learners' autonomy, engagement, and independence to meet their learning needs (Naveed et al., 2023).

As mobile technology offers new horizons for learners, artificial intelligence empowers this technology to influence both teaching and learning in higher education (Cohen, 2011). AI tools enhance learners' engagement in different learning contexts and support language learning beyond the classroom environment (Dahri et al., 2025). AI-based mobile technology motivates language learning and enhances English language proficiency level by offering a large virtual environment for language practice (Arini et al., 2022). This environment can be accessed at anytime and anywhere thanks to the dynamic feature of mobile technology.

To address the research questions, the study follows a parallel mixed method design permitting triangulation of results and comprehensive interpretation of findings.

2– Method and Tools:

In order to study the correlation between mobile technology, AI and learners' learning styles, a social constructivist approach is applied via a concurrent mixed method research that is conducted at ENS Djelfa in Algeria. This research design allows triangulation of the data and ensures more validity and reliability to the research as it evokes complementary relation between two methods that helps deep explanation of the outcomes (Oranga, 2025). The research adopts two main tools. These are the questionnaire and the semi structured interview. Part of the questionnaire is adopted from Neil Fleming VARK model developed in 1987. VARK stands for Visual, Auditory, Read/Write, Kinesthetic types of learning styles (Fleming & Baume, 2006). This model is very used in the academic community because of its simplicity and practical items (Tsevelmaa & Ulziihuyag, 2025). For instance, after reviewing 20 papers, Tomic et al. (2023) conclude that the VARK questionnaire reliability and validity in those articles are positive.

3.1– Population and Sampling

The questionnaire population consisted of 61 L1 EFL students at ENS Djelfa among whom a convenient sample of 28 participants replied to the questionnaire form. For the interview, researchers adopted a convenient sampling of six participants from the same population. The participants accepted to be interviewed without recording. The

following table describes the sample of the study.

Table (1): Population and sampling

Participants	Number	Gender	Age
Population	61 L1 EFL students	57 female 4 male	17 - 20
Questionnaire sampling	28 L1 EFL students	female	17 - 20
Interview sampling	6 L1 EFL students	3 female 3 male	18 - 19

3.2– Instruments

3.2.1– The Questionnaire

The study adopted the questionnaire as a research tool to collect quantitative data. The items in the questionnaire were divided into two parts: part for background items considering age and gender and another one with 25 close-ended questions that are directly linked to the research questions and which consist of yes/no questions and multiple choice questions. As the wording of questions can impact the participants' answers (William, 2003), the questions were short to increase the readability of the questionnaire. The close-ended questions were divided into four sections. The first section, with 10 questions, tackled the use of mobile technology in relation to learning. The second, consisting of 5 items, dealt with AI use through mobile technology. The following section adopted 8 VARK questions to explore the learning styles. The last section represented the respondents' opinion about their learning manners.

3.2.2– The Interview

A semi structured interview was chosen for the qualitative data collection. The interview open-ended questions about the use of mobile technology and AI, as well as the preferred learning styles, took place in person with 6 participants. The interview followed Creswell (2014) protocol starting by setting the background of the research and explaining the instructions. Then, the interviewer asked questions that may generate other items over discussion. The interviewees were asked questions until no related question was elaborated. The interviewer took written notes and finished the face to face interview by thanking the participants.

3.3– Data Collection Procedures

A piloting phase preceding the administration of the questionnaire to the participants was conducted in order to increase the instrument's validity (Bell, 2014). The aim of this phase was to ensure the clarity and to increase the internal reliability of the

questionnaire items. The same questionnaire was administered to the same participants two months later in order to compare the first phase and second phase answers. The preliminary results indicated high correlations between the two phases' answers. The questionnaire was, then, adopted and sent to the convenient sample through Google Form and remained open to receive answers for two months. An anonymity statement at the heading of the questionnaire was included to protect the participants' personal data. Although the questionnaire was sent to sixty students, only 28 replied.

While interviewing the participants, notes were taken then analyzed thematically by collecting the frequent keywords. Each interview lasted for ten minutes. The Data collection of both the online questionnaire and the interview was done simultaneously. The questionnaire data were analyzed and presented in statistical figures by Google Form 2026. These results were compared to the interview notes to set the final findings of the study.

4– Results

4.1– The Questionnaire Results

Part One: Mobile Technology and Language Learning

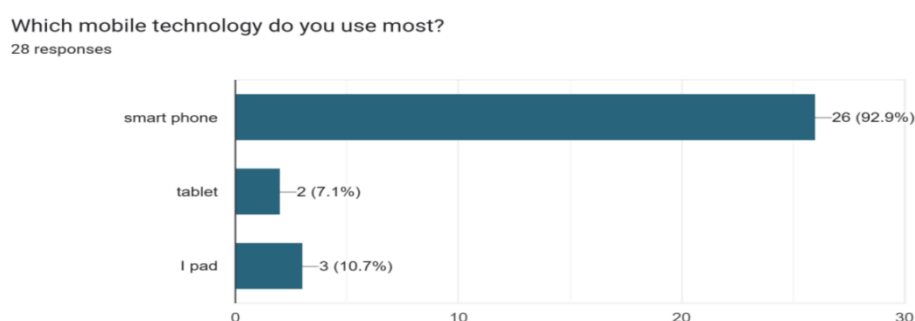


Figure (1): Answer 1
Source. Google Form (2026)

Figure 1 shows the mostly used technology among L1 EFL students at ENS Djelfa it indicates that 92.9 % of the participants use the smart phone. Whereas Figure 2 refers to the time devoted to academic purposes when using the mobile technology devices with 46.4% of respondents who usually use this technology for academic objectives, and 39.3% who always use mobile technology for the same aim.

How often do you use mobile technology (smartphone, tablet, I pad) for academic purposes?
28 responses

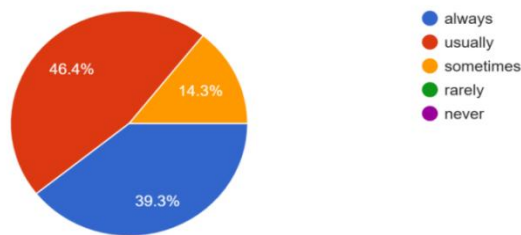


Figure (2): Answer 2
Source. Google Form (2026)

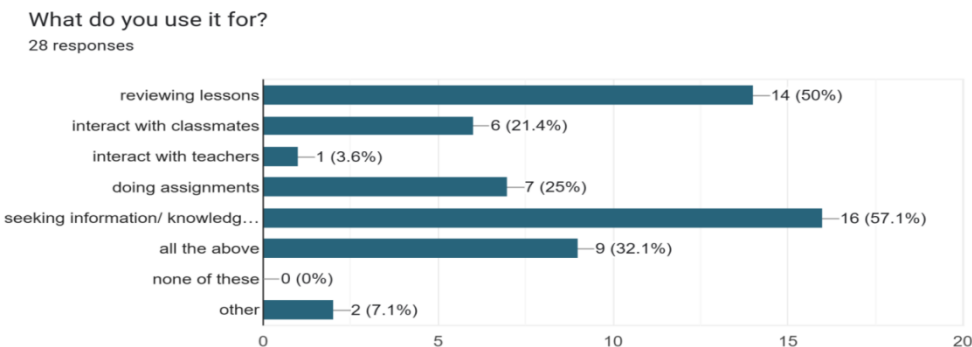


Figure (3): Answer 3
Source. Google Form (2026)

In Figure 3, it's noticeable that half of the participants use mobile technology to review their lessons and 57.1% seek information and knowledge on this technology. They also do their assignments (25%) and interact with their classmates (21.4%) through mobile technology. Interaction with teachers is low (3.6%). according to Figure 4, 50% of the participants spend more than 2 hours per day using mobile technology to study. 21.4% spend 2 hours for that, and 28.6% study through mobile technology for less than 2 hours per day.

How many hours per a day do you spend studying on you device?
28 responses

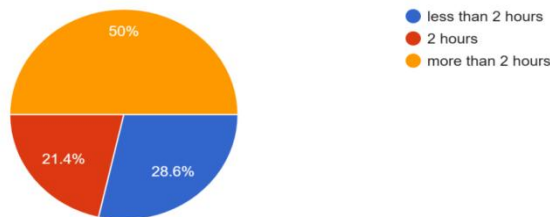


Figure (4): Answer 4
Source. Google Form (2026)

Students rely mostly on the classroom interaction (67.9%) and the email (64.3%) to communicate with their teachers as shown in Figure 5. however all of them rely on mobile technology to get information and complete their assignments as indicated in Figure 6.

How do you communicate with your teachers?
28 responses

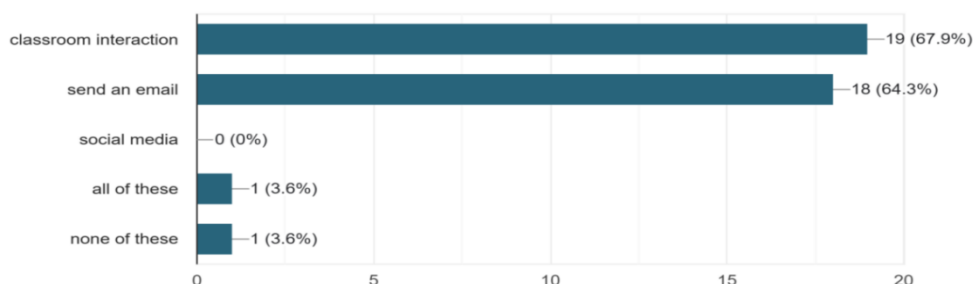


Figure (5): Answer 5
Source. Google Form (2026)

How do you get information to do your assignments?
28 responses

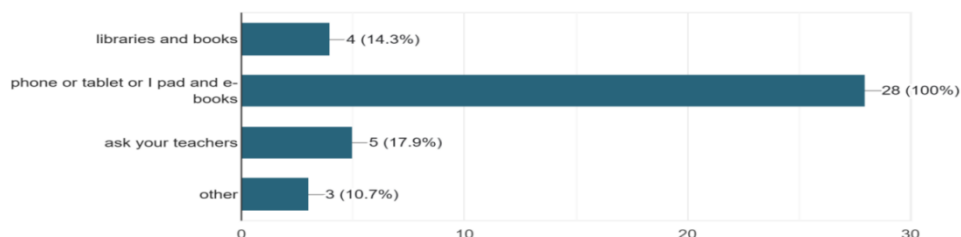


Figure (6) Answer 6
Source. Google Form (2026)

Figure 7 indicates that EFL learners highly use translation applications on their mobile technology (64.3%). 28.6% use Progres application which is an institutional application that provide administrative assistance for Algerian students. 25% use dictionaries and 39.% use other language applications.

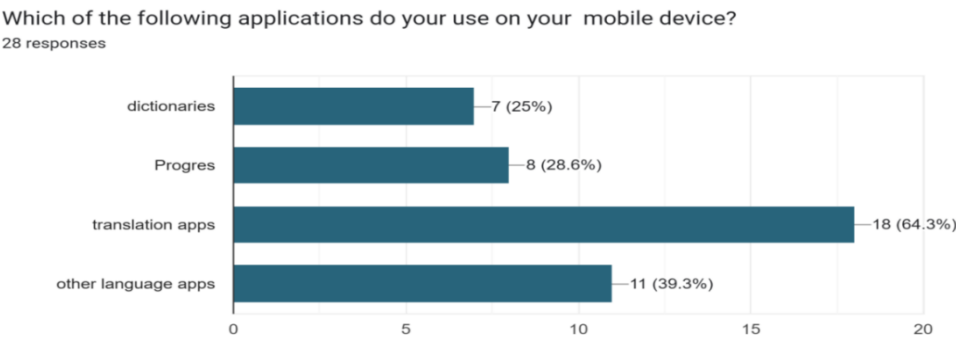


Figure (7): Answer 7
Source. Google Form (2026)

When searching information related to their lessons, 53.6% of respondents use mobile technology everywhere. The figure below also reveals that 50% of the participants use it at home. 17.9% use it at university (ENS) and 7.1% look for information while they are outside.

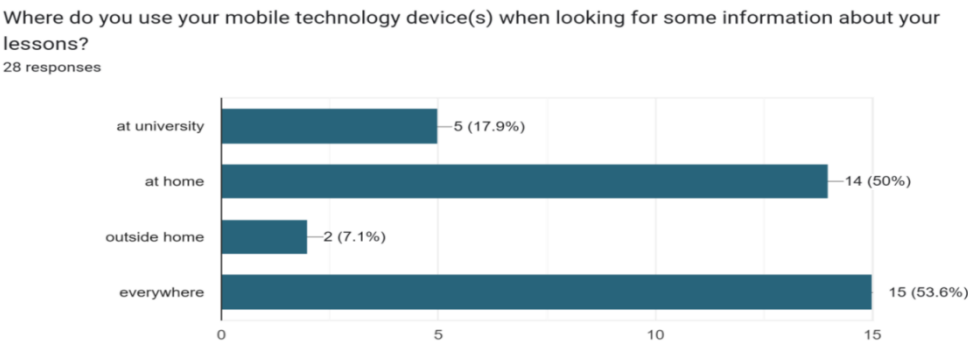


Figure (8): Answer 8
Source. Google Form (2026)

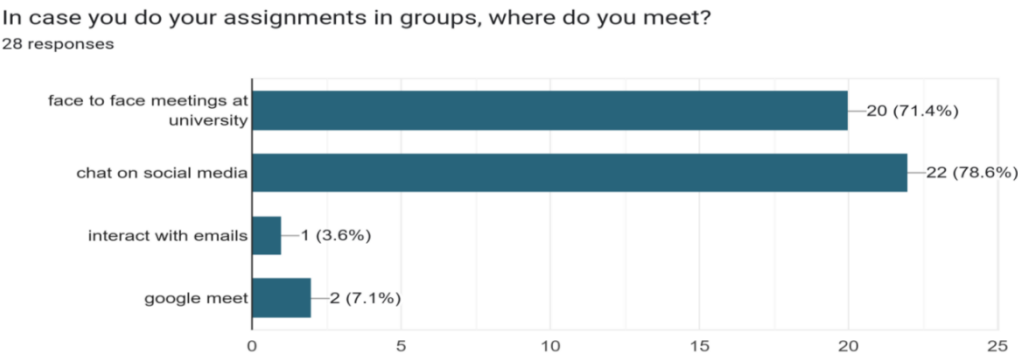


Figure (9): Answer 9
Source. Google Form (2026)

Group work and classmates' interaction are presented in Figures 9 and 10 respectively. The results show that almost all participants (92.9%) interact with one another everywhere through smart-phones, and 78.6% chat on social media. 71.4% meet at university.

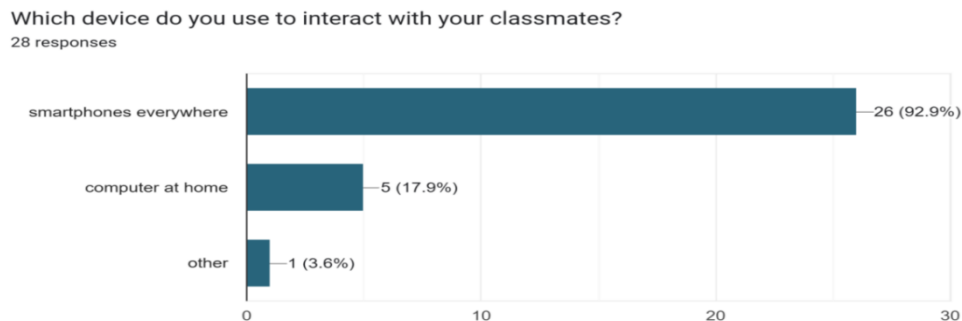


Figure (10): Answer 10
Source. Google Form (2026)

Part Two: AI on Mobile Technology

The questionnaire results in this section show that almost all participants use AI tools on their mobile technology devices (Figure 11). 75% of them think that they can gain knowledge through AI tools and 57% assume that they update their knowledge by using these tools (Figure 12)

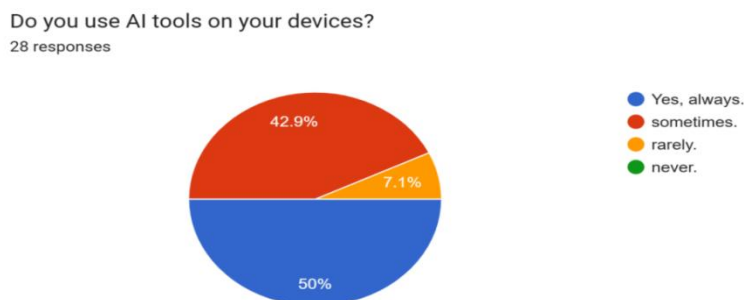


Figure (11): Answer 11
Source. Google Form (2026)

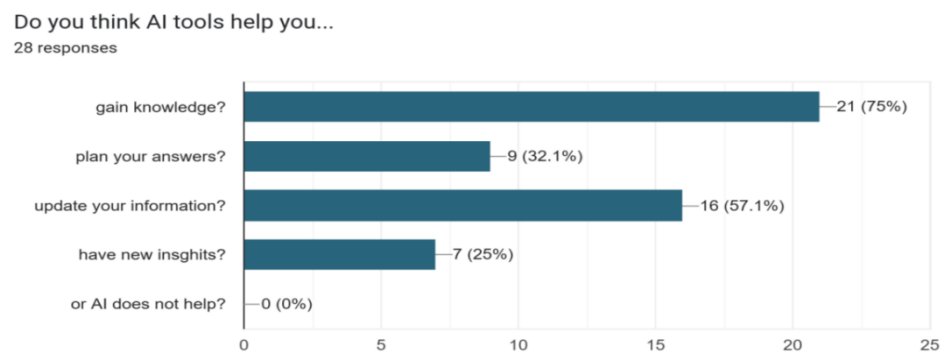


Figure (12): Answer 12
Source. Google Form (2026)

Figure 13 indicates that almost participants have positive attitude toward AI tools, revealing that the tools are very helpful according to 57.1% of them and helpful for 39.3% of the sample. More than 53% of respondents use AI generators seeking information as presented in Figure 14. The use of AI generators in Figure 15 vary from looking for assistance (39.3%) to solving problems (35.7%), and defining words (17.9%). few participants (7.1%) use AI to generate answers.

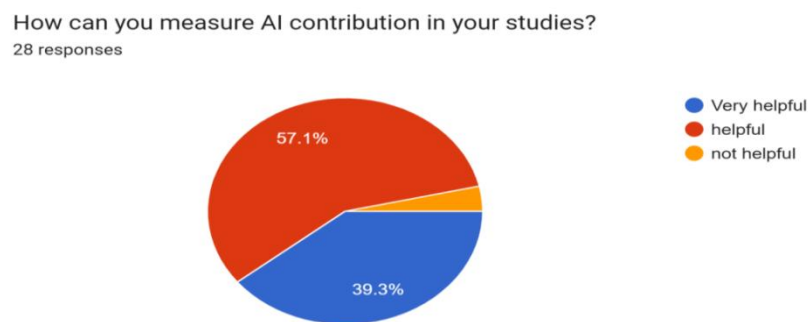


Figure (13): Answer 13
Source. Google Form (2026)

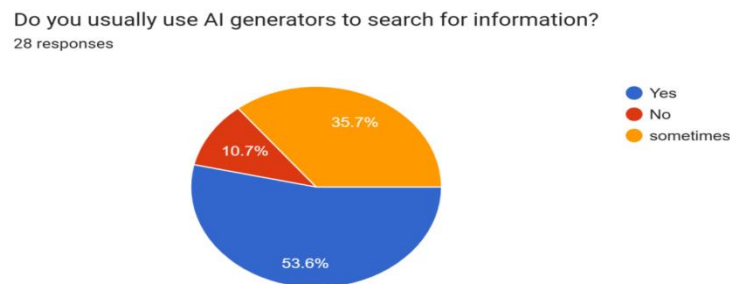


Figure (14): Answer 14
Source. Google Form (2026)

In case you use AI generators, is it to...

28 responses

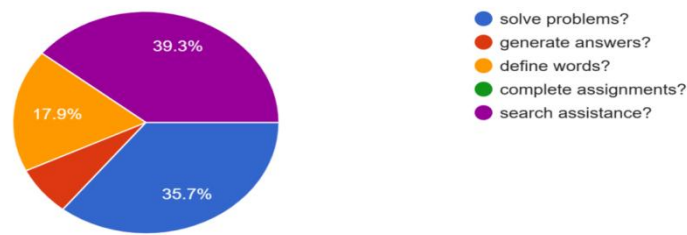


Figure (15): Answer 15

Source. Google Form (2026)

Part Three: Learning Styles

The section describing the learning preferences of respondents shows that the majority of them prefer face-to-face classroom interaction (67.9%) as presented in Figure 17. The preferred support according to Figure 18 is written to 50% of participants, visual to 46.4%, whereas aural support has less preference among participants with 7.1%.

While studying I would use a support that is

28 responses

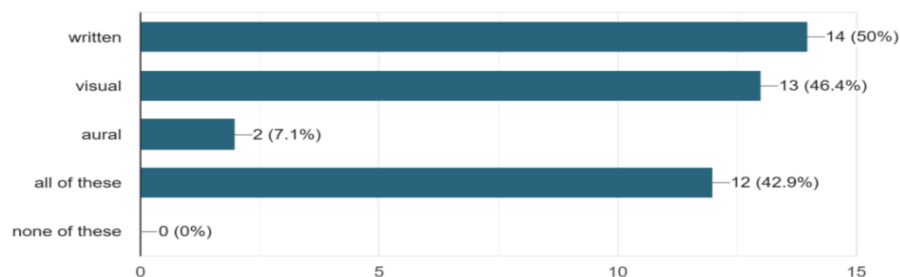


Figure (16): Answer 16

Source. Google Form (2026)

When studying, I prefer

28 responses

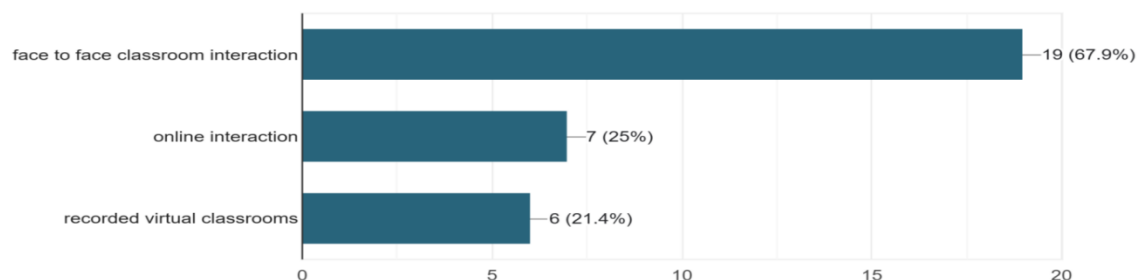


Figure (17): Answer 17

Source. Google Form (2026)

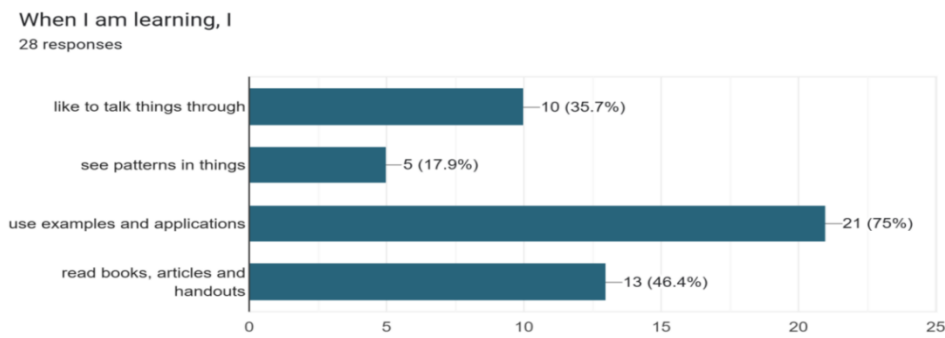


Figure (18): Answer 18
Source. Google Form (2026)

When solving problems, 57.1% of participants rely on listening to an explanation and asking questions (Figure 19). 35.7% choose watching others trying to solve the same problem before they begin working on it. Less participants prefer explanation through diagrams (25%), and 21.4% would read the instructions.

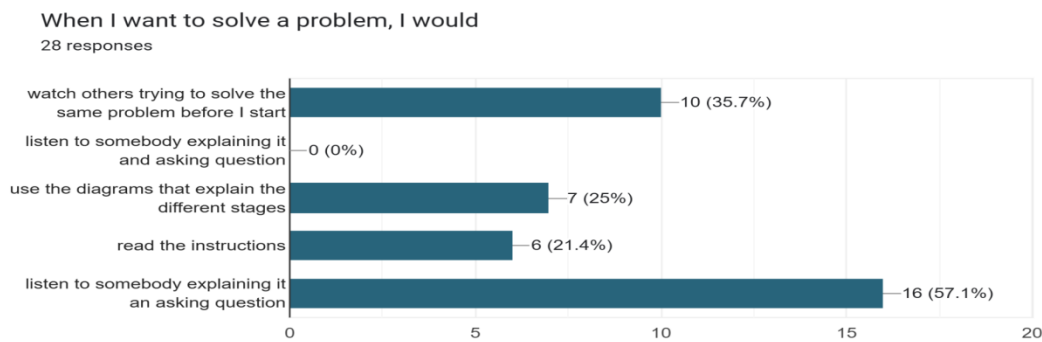


Figure (19): Answer 19
Source. Google Form (2026)

The choice of themes or topics applies to knowledge in real situation to 60.7% of participants according to Figure 20. 39.3% would consider working with designs, maps, or charts. 28.6% choose to communicate with others through discussions. However, when learning from internet, 78.6% of participants like watching videos showing how to do or make things (Figure 21). Fewer learners like interesting design and visual features (35.7%), or interesting written descriptions and lists.

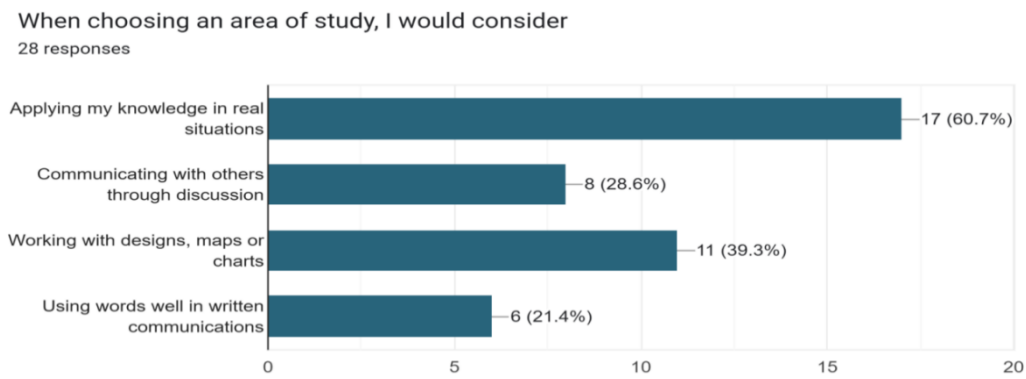


Figure (20): Answer 20
Source. Google Form (2026)

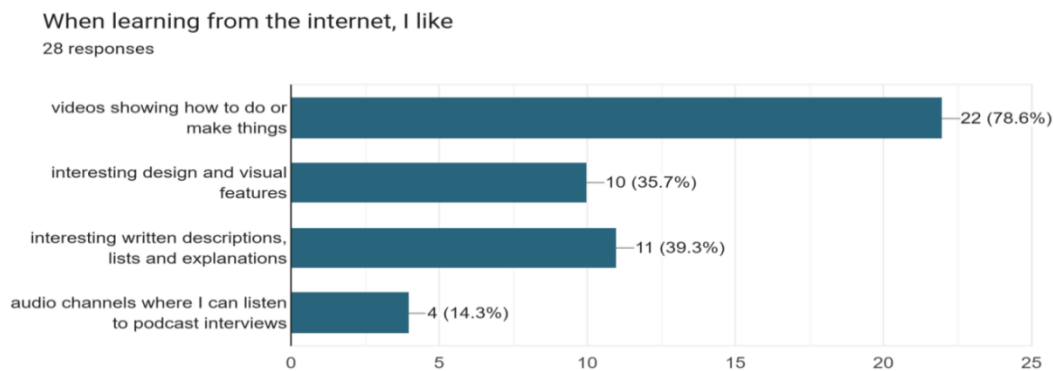


Figure (21): Answer 21
Source. Google Form (2026)

When participants want to learn about a new project, 60.7% of them would equally ask for a written report describing the main features of the project and examples where it has been used successfully (Figure 22). The participants' preference of the teaching strategy, shown in Figure 23, varies from 42.9% who prefer a lecturer who uses question and answer, group discussion, or guest speaker; to 32.1% of respondents preferring a teacher who uses demonstrations, models, or practical sessions. 39.3% would like the one using diagrams, charts, maps, or graphs. 35.7% like the teacher who uses handouts, books, or readings.

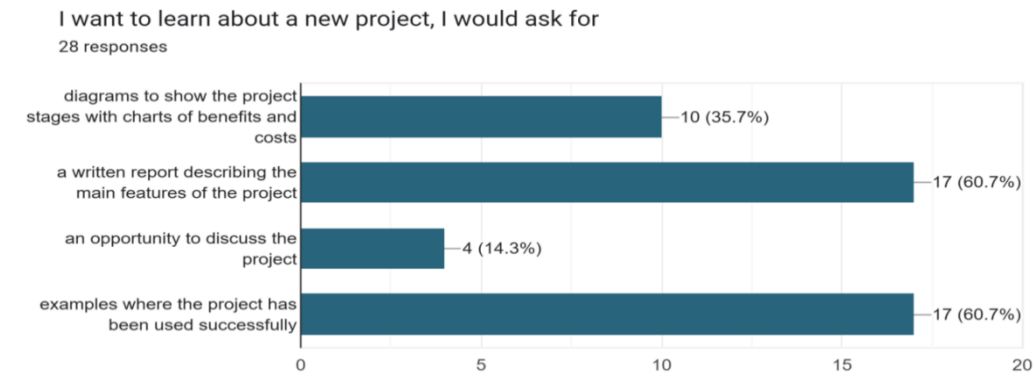


Figure (22): Answer 22
Source. Google Form (2026)

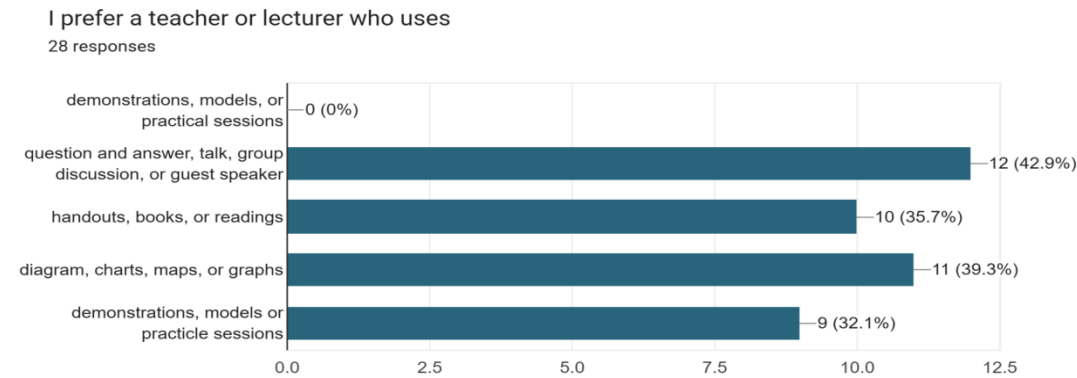


Figure (23): Answer 23
Source. Google Form (2026)

Part Four: Personal Opinion

The last part of the questionnaire consists of two questions about the participants’ opinions. The answers reported through Google Form are presented in Figure 24 and Figure 25. The results show that 82.1% of respondents think that knowledge can be constructed. When the participants are asked to describe themselves as learners, 35.7% related that to the nature of the module or subject being studied, and 17.9% related the answer to the topic of the class. 10.7 linked that to the classroom interaction. However, 32.1% described themselves as active learners.

Do you think knowledge can be constructed?
28 responses

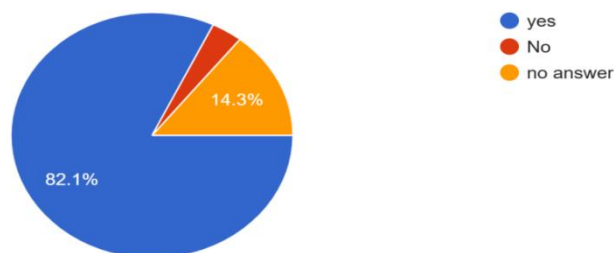


Figure (24): Answer 24
Source. Google Form (2026)

How do you describe yourself as a learner?
28 responses



Figure (25): Answer 25
Source. Google Form (2026)

4.2– The Interview Main Results

The interview was used to understand the relationship between students' learning styles and the use of mobile technology and AI. The results revealed that the mobile technology that is used by participants is smart phones. The participants reported that using smart phones in their studies is a need since lessons and assignments are shared on the different groups of social media. They mentioned that this technology keeps them updated with announcements and updates of the department administration and teachers.

In learning, the participants evoked the use of smart phones as a mobile library that enables them to download various resource materials, read different texts, and watch or listen to videos in relation to their studies. They focused on the functional features of smart phones like easiness of use, rapidity to access information and effectiveness.

Students also emphasized the hard use of Moodle platform on their mobile devices, reporting that its format and design do not fit the smart phone. However, they showed satisfaction about using Progres application on their phones which facilitates their

enrollment, interaction with the administration, time schedule updates, and checking exam and semester results.

Artificial intelligence is used by the participants on their mobile technology devices, as they reported. It is a useful assistant according to them. It can be used as a translator, a simplifier of difficult concepts, or a tool to generate ideas and texts.

5– Discussion and findings

The questionnaire analysis reveals a prominence of sensory learning styles over personality and cognitive learning styles. EFL students prefer reading, listening and watching videos to learn the various contents and concepts of their modules. This aligns with Mehrpour & Motlagh (2015) classification of sensory learning styles which are linked to the context of learning. Mobile technology offers a social and educative environment that combines social interactions, as well as reactions to the different subjects, that are based on the virtual environment of the technology.

Additionally, the results show EFL learners' reliance on mobile technology, notably the smart phone, to seek knowledge, solve problems, and complete assignments. The availability of devices all time and everywhere emphasizes the common use of smart phones as mobile technology among EFL learners especially through the simplicity and easiness of their use. These results support Bidarra & Sousa (2020) and Saran et al. (2009) concepts of enhancing language learning and language skills by providing authentic context through mobile technology.

Moreover, autonomy of learners and their self-engagement in learning are key results of this research. Both interviewed participants and the ones replying to the questionnaire point out their autonomous learning to meet their individual differences and needs by using their personal mobile technology devices that are adapted to their learning styles. The outcomes alignment with Alehegn & Mentor (2019) and Naveed et al. (2023) researches confirm the 'civic engagement' of EFL learners and their autonomy that is raised by integrating the smart phones in learning.

EFL learners' use of AI tools to support their learning is explicitly set by the interviewed participants. AI tools are integrated into their mobile technology devices and can be accessed to whenever needed. The multiple tasks performed by AI show the strong connection of learners to AI tools that have become part of their learning strategies inside and outside the classroom, as mentioned by Dahri et al. (2025) and Arini et al. (2022).

On the other hand, the data analysis reveals that mobile technology devices do not support the e-learning platform (MOODLE) and learners often prefer chat groups or social media to access information permanently on their phones. This result suggests

random non institutional learning that sometimes misleads learners or causes confusions. The mobile technology and learning platforms, thus, should support and respect EFL learners learning styles as James W. B., Gardner D. L. (1995) and Verduin & Clark (1991) indicate in their studies.

5.1– Comparison of findings

Table (2): Comparison of findings

The questionnaire findings	The interview findings
Prominence of sensory learning styles	Learners can download various resource materials, read different texts, and watch or listen to videos in relation to their studies
Over-reliance on mobile technology to gain knowledge	Mobile technology is “a need to support learning”. It helps learners keeping updates of their learning environment
Autonomy and self-engagement of learners	Easiness of use, rapidity to access information and effectiveness of mobile technology
Strong connection between learners and AI tools used on their mobile technology	AI is a “useful assistant”.

According to the above table, the findings of the questionnaire correlate with the interview results. For instance, both instruments’ results reveal a preference of the sensory of kinesthetic learning styles among L1 EFL learners at ENS Djelfa in Algeria. Moreover, results of learners' behavior toward mobile technology converge. In the quantitative results, reliance on mobile technology is found. The qualitative results support that by learners’ assumption of mobile technology as a “need” to gain knowledge and updates. In addition, learners are highly self-engaged in the learning process according the statistics, and explain that motivation for autonomy in the interview by stating the reasons which are “easiness of use, rapidity to access information and effectiveness of mobile technology”. Furthermore, the interviewees consider AI as a “useful assistant” to their learning journey while the questionnaire respondents' results present a strong connection between learners and AI tools used on their mobile technology.

Finally, the questionnaire results converge and match with the interview results. This fact increases the research accuracy and provides insights that can be used in further studies. Hence, the paper outcomes are valid. The triangulation of the quantitative and the qualitative results indicates that the findings from both methods converge and provides reliability of results.

6– Conclusion

The paper findings underline a strong relationship between EFL students' learning styles and mobile technology. This latter effectively participates in shaping their learning process. The availability of devices, facility of use and quick accessibility to knowledge artificial intelligence tools are highly integrated in the mobile technology used by EFL learners. AI is significantly present to assist learners permanently. The over reliance on AI tools and the lack of digital literacy may lead to an unaware and unethical use of these supporting technologies. The outcomes emphasize the necessity of adapting learning management systems and platforms, such as Moodle to the mobile technology and students' learning styles. Finally, the research strongly suggests cooperation and coordination between researchers in computational science and didactics in order to conceptualize, design, and develop new learning systems supported by artificial intelligence (AI) tools that can fully apply to mobile technology and which can serve as a mobile pedagogical tool in Algerian higher education.

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