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The Effect of Mobile Learning on Learner Autonomy: A Suggested Measurement Tool to Assess the Development of Learner Autonomy

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Introduction

Mobile technologies are one of the fastest growing technologies in education. For learners, they offer an appealing opportunity to access multiple sources of information anytime and anywhere. Recently, there has been an increasing interest in incorporating mobile learning (mLearning) into the learning-teaching process to enhance learners' academic success in different educational contexts as "traditional teaching and learning methods are becoming less effective in engaging learners and motivating them to achieve" (Gitsaki et al., 2013, p. 1).

Pegrum (2014) defines mLearning as "the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance, and extend the reach of teaching and learning" (p. 15). He also points out that it could enhance anywhere, anytime learning and learners can learn at their own pace as well. Although there has been some integration of mLearning in language classrooms globally, there is little empirical research dealing with the effectiveness of using mLearning on learners' acquisition of language skills and learner autonomy. Education always considers learners and looks for ways to motivate them and incorporating mLearning in education has become a demand in schools. The reason is that the current learners are very familiar with mobile technology, and they use its applications in their daily life. Therefore, it would be motivating for them to use mobile technology and its applications in the classroom.

Literature Review

MLearning and Learner's Autonomy in English Language Acquisition

In second language learning, autonomy is the ability to take charge of one's own learning (Holec, 1981). It is presented as a promising learning construct associated with active learning. It is also seen as a multi-faceted theme with psychological and philosophical ramifications, which does not exist in a single form or degree. It is abstract, and many factors affect learner autonomy in second language learning. Some of these factors are collaborative learning skills, metacognitive strategies that learners follow, emotional intelligence, self-esteem, and self-confidence (Dixon, 2011).

Gitsaki and Robby (2014) conducted an evaluative study on the use of iPads at Zayed University in the UAE, and they point out that this method increases student participation and motivation and more importantly, it creates practice ready and autonomous learners who will lead their organisations into a post PC era. Itayem (2014) maintains that mLearning provides learners with constant access to authentic educational materials.

The Foundations program in some higher education institutions is a program to help develop the English language proficiency of learners who have yet to achieve a score of 5.0 on the IELTS exam. The target is to enable these learners to reach 5.0 or above. According to Hatherley-Greene (2014), some individual institutions in the UAE have been witnessing a problem regarding student retention. Therefore, the colleges have been seeking ways to improve it and the use of iPads in the classrooms has been implemented to improve learners' motivation, engagement, and retention.

The Higher Education iPad Initiative was officially launched by H.H. Sheikh Mohammed Bin Rashid Al Maktoum, UAE Vice President and Prime Minister, and Ruler of Dubai and H.E. Sheikh Nahayan Mabarak Al Nahayan Minister for Higher Education and Scientific Research in April 2012 (Kamali, 2012). The mLearning approach was selected as the model of instruction in the Foundations programs of the federal institutions for the academic year starting in September 2012.

Djoub (2016) conducted an empirical study to examine the effect of mLearning on learners' achievements in language learning. She points out that, "Mobile Assisted Language Learning (MALL) provides learners with the chance to experience new learning modes that go beyond the classroom context, offering them more flexibility, learning choices in terms of context, ways of delivery, learning space, and time, thereby enhancing their learning autonomy" (p. 194). Moreover, Ally (2013) points out that mLearning may motivate learners and transform the learning process as it helps learners to raise their self-esteem, self-confidence, and autonomy.

Furthermore, studies have shown that learners can depend on themselves to explore the mobile materials they have, and they can develop the habit of independent learning. For example, Attewell (2005) conducted a three-year study on the impact of mLearning on learners' learning patterns and attitudes towards information and communication technologies (ICTs) and found that mLearning encouraged both independent and collaborative learning experiences and raised learners' autonomy.

In addition, Al-Jarf (2012) conducted an experiment on mobile technology and student autonomy in oral skill acquisition at a Saudi University. The results show that the listening and speaking posttests mean scores for the experimental group were higher than those of the pretests mean scores. Responses to the post-treatment questionnaire showed "positive attitude towards the mp3 self-study listening and speaking lessons [and learners] were encouraged to take responsibility for their own practice and their own learning" (p. 126). As a result, this technique helped learners be independent in their language learning.

Learner Autonomy Measurement

In the literature, it is necessary to understand autonomy as a quality, which has only an abstract existence if it is not found in a context (Dixon, 2011). In second language acquisition, autonomy is the ability to take charge of one's own learning (Holec, 1981). There have been many attempts to measure learner autonomy in the literature (Dickinson, 1987; Holec, 1981; Little, 1991; Littlewood, 1999).

La Ganza (2008) distinguishes six different dimensions of autonomy:

1. Political: learners taking control of learning.
2. Liberal progressive: Learners taking responsibility.
3. Behavioural: strategy development.
4. Humanistic: self-initiative or self-direction.
5. Technical: using one's ability.
6. Psychological: the psychological capacity to self-direct.

Inquiry-Based Learning and Learner Autonomy

According to Healey (2014), Inquiry-Based Learning was derived from the constructivist theory in which a learner constructs or builds knowledge by himself/herself through personal or societal experience. Healey (2014) points out that someone qualifies as an autonomous learner when he/she independently sets goals, chooses materials, methods, and tasks, and tries to achieve his/her goals. Autonomous learners work in organising and carrying out the chosen tasks and choose criteria for evaluation. (Holec, 1981).

Metacognitive Skills and Learner Autonomy

Regarding metacognitive skills and according to Flavell (1979), metacognition means thinking about thinking and reflecting on what you know and what you do not know. Dixon (2011) maintains that autonomy requires metacognition, while Sinclair (1999) interprets it as a conscious awareness of the learning process. Breen and Mann (1997) state that the autonomous person can step back from what he/she is doing and reflect upon this in order to make decisions about what he/she next needs to do and experience.

Emotional Intelligence and Learner Autonomy

Buvoltz, Powell, Solan, and Longbotham (2008) studied the relationship between Emotional Intelligence and Learner Autonomy and the results indicated that there was a strong positive relationship between both of them. Emotional Intelligence is defined as "an assortment of mental abilities and skills that can help you to successfully manage both yourself and the demands of work with others" (Walton, 2012, p. 4). Goleman (1995) points out that emotional intelligence has four areas: self-awareness, self-management, social awareness and relationship management (as cited in Walton, 2012).

This study is an attempt to examine the effect of using mLearning in Foundations classes on the Academic Learner Autonomy of the learners. The research question was: To what extent does mLearning affect learners' second language learning autonomy?

Method

To measure the development of language learner autonomy, a mixed methods approach to data collection was utilized on a case study of 5 learners in the Foundations program, which aims to prepare high school graduates with the necessary academic skills for undergraduate study including English language proficiency, Math skills, IT skills, research skills, library skills, and study skills.

Three different types of assessments were implemented to measure the development of learner autonomy for five learners. These tests were two inquiry-based projects (I), eight metacognitive tasks (M), and two emotional intelligence assessments (E).

The framework (I & ME) could indicate the progress of learner's autonomy of these learners comparing and contrasting their degree of autonomy in the beginning and at the end of the experiment. Each of these learners received a score for each of the three skills I & ME as a pre and post assessment. These scores were designed to be heads of a triangle, and the area of the pre and post triangles were calculated to indicate the development of each of these learners' autonomy levels using Heron's formula (Stone, 2014); Area $= \sqrt{p\,(p-a)(p-b)(p-c)}$ Where p is half the perimeter or p$= \frac{a+b+c}{2}$ and a, b, & c are the sides of the triangle. Figure 1 shows the I & ME Learner Autonomy Development suggested Framework.
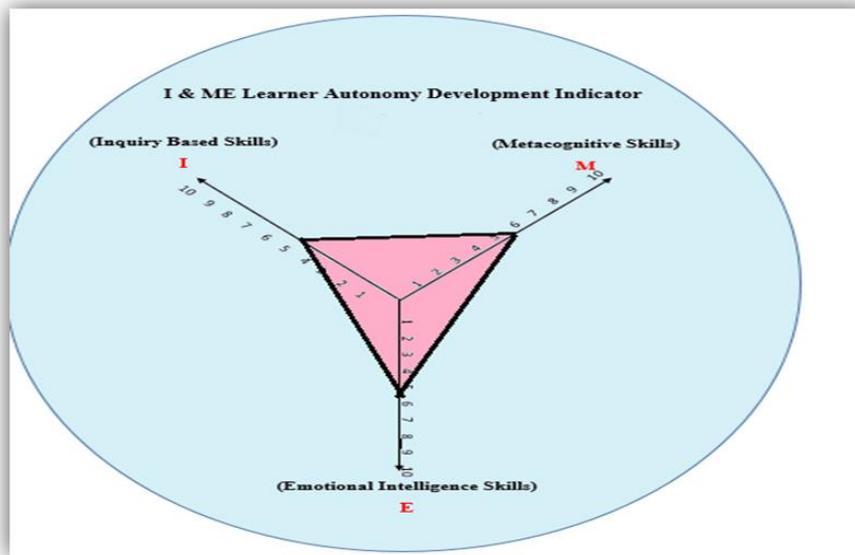
Figure 1. The I & ME framework for measuring learner autonomy development. (Al Zieni, 2017)

The I & ME model was to indicate the development of learner autonomy. It was based on three essential dimensions of autonomy, which are inquiry-based learning skills, metacognitive skills, and emotional intelligence skills.

Inquiry-Based Projects Assessments

Two inquiry-based projects (WebQuests) were designed as a pre-assessment and post-assessment for five learners in the experimental group. A WebQuest is an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet (Dodge, 1995). According to Al Zieni (2009), "A Web Quest is a learning activity in which learners read, analyze, and synthesize information using the World Wide Web." (p. 72). Learners cooperate and work in groups to complete a particular job. Each member of a group can be given a role, thus encouraging participation and interaction. Every Web Quest has an Introduction, Task, Process, Evaluation, and Conclusion. All these tasks together aim at promoting critical thinking at the levels of analysis, synthesis, and evaluation.

The researcher evaluated each of the five learners according to their performance in these projects. These learners worked as members of groups to complete the task. These learners investigate, collaborate, and engage to perform self-directed learning. A fact sheet was produced for learners to work on, and a rubric was developed to evaluate their achievement in the WebQuest. The first project was conducted in the first week of the experiment and the second project in week seven. Figure 2 shows a screenshot of the homepage of these two Web Quests.
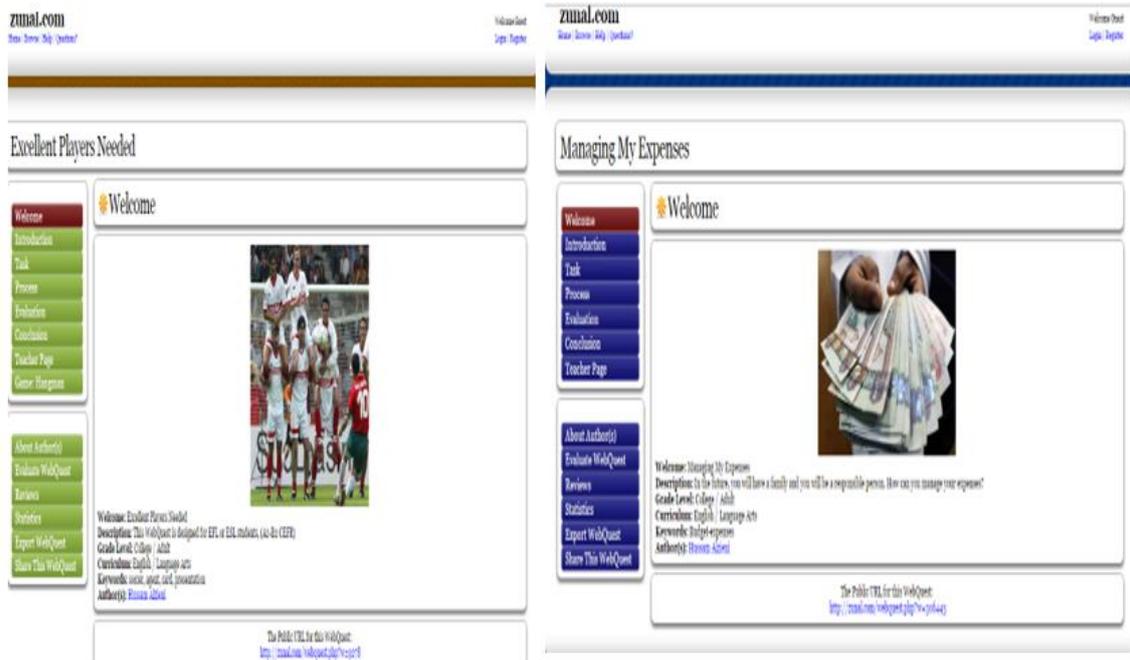
Figure 2. Inquiry-based projects (Web Quests).

Metacognitive Skills Assessments

A reflection is a form of metacognitive skills. The researcher adopted an independent learning reflection form from Janine Welsby (as cited in Dixon, 2011). Figure 3 shows the independent learning reflection form.

Figure 3. Independent learning reflection form.

The five learners reflected on their studies throughout seven out of the eight weeks of the experiment because the last week of the experiment was relegated to final examinations. A grading rubric was designed to grade them during week 1 and week 7.

The Emotional Intelligence Skills Assessments

An emotional intelligence test was used to test the five learners' level of EI at the beginning of the experiment and the end of it. This test was used at DMC as part of the undergraduate course and was adapted from Weisinger's (1998) Model.

A continuum grade showed the learners' EL grade. Figures 4 and 5 show the emotional intelligence assessment and the emotional intelligence continuum.

I & ME Model_Emotional Intelligence Assessment

Name:_____ ID:_____

#	Area	Mostly False	Mostly True
1	Know when you are becoming angry.		
2	Know when you are communicating in a way that is NOT appropriate/out of place.		
3	Alter your emotional state by using internal reasoning or talking to yourself.		
4	Help others manage their emotions.		
5	Mediate conflict between others.		
6	Engage in emotional conversations with others.		
7	Act productively when angry.		
8	Know the effect that your behavior has on others.		
9	Know when you are becoming defensive.		
10	Relax when under pressure in situations.		
11	Stay calm when you are the target of anger from others.		
12	Show effective interpersonal communications skills (with others)		
13	Reflect people's feelings back to them accurately.		
14	Know how you interpret events you experience.		
15	Make others feel good.		
16	Recognize when others are unhappy.		

Figure 4. Emotional intelligence assessment

Emotional Intelligence Scoring Sheet
(Pre-Assessment)

Name:_____ ID:_____

Sum your responses in the two columns titled (Mostly False) and (Mostly True).

Your total EI score = Mostly true answers

➤ **Emotional Intelligence Continuum: Circle your score**

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

Score 14-15 = High EI

Score 10-13 = Good EI

Score 6-9   = Moderate EI

Score 0-6   = Below Average EI

➤ **Emotional Intelligence Sub-dimensions:**

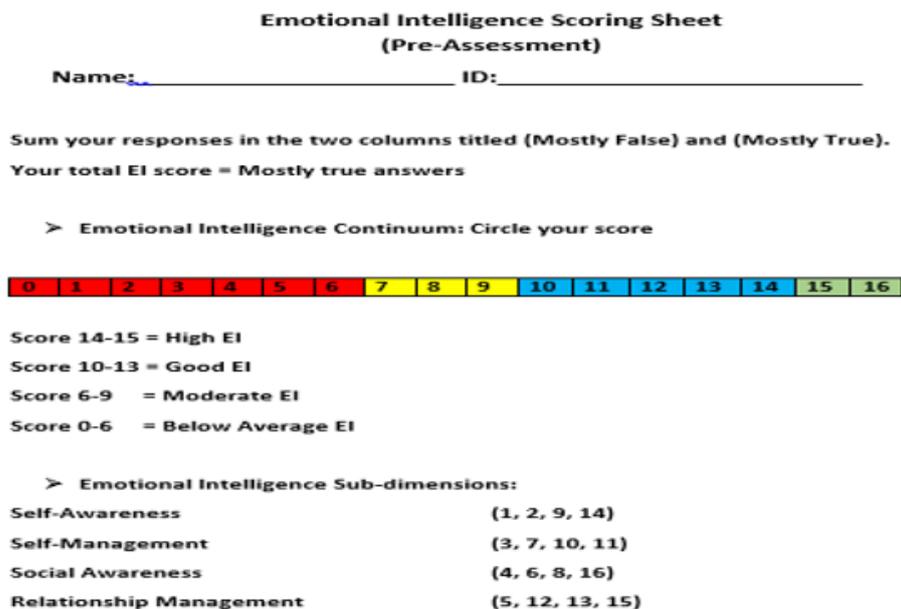| Self-Awareness | (1, 2, 9, 14) |
Self-Management	(3, 7, 10, 11)
Social Awareness	(4, 6, 8, 16)
Relationship Management	(5, 12, 13, 15)

Figure 5. Emotional intelligence continuum.

This variety of different instruments provided the researcher with a plethora of data about the topic for data analysis purposes.

Results

The research question studied the impact of mLearning on learner autonomy and the researcher used a model that had three different areas: inquiry-based skills, metacognitive skills, and emotional intelligence skills. This I & ME Model was used as an indicator of the development of learner autonomy for five learners from the treatment group as a case study.

Results of the two Inquiry-Based Projects Assessments:

Regarding the first area, quantitative results of the achievements of the five learners showed that there is an improvement in learner autonomy for most cases, but the level of autonomy differs from one student to the other. Table 1 shows the grades the five learners got in the pre and post-inquiry-based projects.

TABLE 1
The Pre and Post Inquiry-based Project Grades

Student	Pre-Inquiry-based Project Grade/10	Post-Inquiry-based Project Grade/10
A	5	8
B	6	9
C	5	6
D	5	8
E	4	7

Results of the Metacognitive Thinking Skills Assessments:

The five learners did a weekly reflection throughout the course. The first and last reflections were graded based on a metacognitive skills rubric. Table 2 shows the scores that these learners received.

TABLE 2
Scores of the First and Last Reflection of the Case Study

Student	First Reflection Score/10	Last Reflection Score/10
A	7.6	8.8
B	7.2	8
C	5.5	5.6
D	7.2	9.6
E	5.2	6.4

In summary, based on these results, the five learners have developed some metacognitive thinking skills throughout the study. The degree of development naturally differs from one student to another. It is suggested that the development in their metacognitive skills could be attributed to the impact of mLearning, which provides more platforms for reflections than more traditional ways of learning. Applications like Socrative, Poll Everywhere, and Nearpod provide excellent opportunities for these learners to develop their metacognitive skills. Consequently, these learners' autonomy has also developed because there is a direct correlation between metacognitive thinking skills and learner autonomy as supported previously in the literature.

Results of the two Emotional Intelligence Assessments:

Qualitative data collected from the pre- and post-Emotional Intelligence Assessment showed that 4/5 learners improved their emotional intelligence scores. Tables 3 and 4 illustrate the results of the pre and post emotional intelligence assessments.

TABLE 3
The Results of the Pre-Emotional Intelligence Assessment (n = 5)

Student	Continuum Score/16	Score Description	Self-Awareness	Self-Management	Social Awareness	Relationship Management	Score /10
A	11/16	Good EI	4/4	2/4	3/4	2/4	6.9
B	15/16	High EI	4/4	3/4	4/4	4/4	9.4
C	10/16	Good EI	3/4	1/4	2/4	4/4	6.3
D	11/16	Good EI	3/4	1/4	3/4	4/4	6.9
E	16/16	High EI	4/4	4/4	4/4	4/4	10

TABLE 4
The Results of the Post-Emotional Intelligence Assessment (n = 5)

Student	Continuum Score/16	Score Description	Self-Awareness	Self-Management	Social Awareness	Relationship Management	Score /10
A	12/16	Good EI	4/4	2/4	3/4	3/4	7.5
B	12/16	Good EI	3/4	2/4	3/4	4/4	7.5
C	9/16	Moderate EI	3/4	1/4	3/4	2/4	5.6
D	6/16	Moderate EI	0/4	1/4	3/4	2/4	3.8

Therefore, this test indicates and suggests the development of the Emotional Intelligence score for (4/5) learners. This is also an indicator of the development of learner autonomy.

By analysing quantitative data collected from the I & ME model, we can find that there is a development in the learners' learner autonomy level. The following table shows the results of the three areas examined: inquiry-based skills (IBS), metacognitive skills (MCS), and emotional intelligence skills (EIS). Each represents a side in a triangle, and then, we could find the approximate area of each triangle following Heron's formula where p is half the perimeter or $p = \frac{a+b+c}{2}$ and a, b, & c are the sides of the

triangle. Table 5 shows the results collected from the inquiry-based skills assessments, the metacognitive skills assessments, and the emotional intelligence skills assessments.

TABLE 5
Final Results of I & ME Framework (n=5)

Student/Area	A	B	C	D	E
IBS (pre)	5	6	5	5	4
IBS (post)	8	9	6	8	7
MCS (pre)	7.6	7.2	5.5	7.2	5.2
MCS (post)	8.8	8	5.6	9.6	6.4
EIS (pre)	7.5	7.5	5.6	3.8	8.1
EIS (post)	9.4	9.4	6.3	6.9	10
Area of Pre-Triangle %	42.6%	48.3%	28.4%	27.6%	31.3%
Area of Post-Triangle %	74.9%	76.5%	35.7%	64%	59.1%

The following figure shows a comparison between the two triangles for one of these learners, which reveals the different degree of development in learner autonomy.
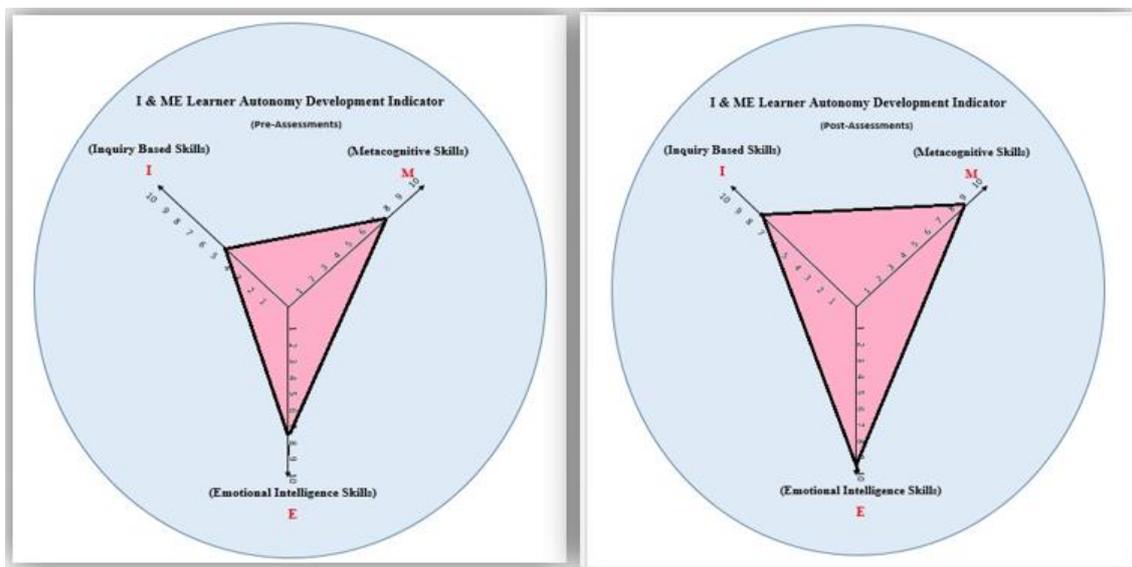

Figure 6. Comparison between the degree of learner autonomy for the student (A) in the pre-assessment (42.6%) and the post-assessment (74.9%).

The findings above from the I & ME framework assessments suggest that there is an improvement on the learners' achievements on the three major areas: inquiry-based projects, metacognitive thinking skills, and emotional intelligence skills. The results support that mLearning has developed the autonomy of these cases in the experimental group because it creates a context for these learners where they have more freedom of self- expression, and autonomy than in traditional classrooms. Through mLearning educational apps, learners find more opportunities to learn about their classmates and obtain self-directed learning experiences. Consequently, the hypothesis regarding the positive impact of mLearning on learner autonomy is accepted.

Discussion and Conclusion

The I & ME learner autonomy development assessments suggested that there was a development in learner autonomy for most of the five students who were under experiment. This development differed from one student to another. These results are in agreement with the study results of Ally (2013), Itayem (2014), and (Djoub, 2016). According to Djoub (2016), mobile-assisted language learning (MALL) enhances learner autonomy.

The positive impact that mLearning had on language acquisition and learner autonomy could be attributed to the interest and appeal that using the devices could bring to the learning context. MLearning devices have merits over all other technologies because its flexible devices enable learners to be exposed to a considerable amount of authentic material. Additionally, this consistency could not be found by using personal computers or even laptops. MLearning personal, portable devices enable new ways of learning emphasizing continuity or spontaneity of access and interaction across different contexts of use. They support collaboration and social interaction with constant access to authentic and cultural materials in teaching languages. One device can offer a light and portable yet powerful learning resource. It provides ample opportunities for independent learning with attractive apps that are favourable to the digital native learners.

The results of this study provided an insight into the reasons behind the positive impact of mLearning on learner autonomy. It enhances learner autonomy on some levels. It allows the learner to reduce the memorization time and gives more time for higher levels of thinking skills such as application, analysis, evaluation, and creation. MLearning provides a chance for a higher level of thinking skills practice and decreases the amount of the lower level thinking skills such as remembering and understanding. The use of mobile apps, with their features, affect all senses of the students and make it easy for them to learn effectively.

To sum up, this study suggests that integrating mLearning in English Language teaching and learning in the Foundations programs could foster learner autonomy. This study has also recommended that the I& ME model might be used to measure the development of Learner Autonomy in other similar contexts.

The Author

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