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Research Article

Identifying barriers faced by university EFL instructors in integrating mobile-assisted language learning

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ABSTRACT

The present study aimed to examine the barriers faced by Taiwanese university English as a foreign language (EFL) instructors when incorporating mobile-assisted language learning (MALL) into their teaching, and to explore how these barriers are influenced by the instructors' background characteristics. To assess the variables, a survey questionnaire was developed and administered to a sample of 350 university instructors. Additionally, interviews were conducted with a subset of instructors to complement and clarify the quantitative data. The findings indicated that university EFL instructors encountered moderate barriers when integrating MALL into their teaching practices. Furthermore, the study identified significant differences in the barriers experienced based on the amount of time instructors dedicated to MALL on a daily basis. Both quantitative and qualitative data highlighted the importance of time as a critical factor for successful MALL integration. As a recommendation, it is advised that university administrators consider reducing instructors' workload to facilitate the seamless integration of MALL.

Keywords: mobile-assisted language learning, English as a foreign language, barrier, technology integration

INTRODUCTION

Mobile technology has emerged as a promising and widely used tool in language teaching (Gikas & Grant, 2013). It offers numerous benefits, including flexibility, accessibility, individualization, and cooperative learning, all of which are considered crucial for enhancing language proficiency (Cheon et al., 2012). With the advancement of digital technology, the integration of the internet and mobile devices has expanded, giving rise to mobile-assisted language learning (MALL) (Chuang, 2017; Hsieh & Tsai, 2017; Shuib et al., 2015). MALL has demonstrated the ability to improve students' concentration, enhance their learning motivation, and promote teacher-student interaction and communication (Lan et al., 2013; Stockwell, 2007; Zurita & Nussbaum, 2007). Researchers highly recommend the use of MALL to improve language learning outcomes (Lan et al., 2013).

Consequently, many universities actively embraced mobile technology to establish a flexible and ubiquitous learning environment for teachers and students, catering to the unique language learning needs of individuals. In addition, college students are among the most frequent users of mobile devices for accessing online learning materials. As a result, considerable research has been dedicated to exploring the applications of MALL, particularly in higher education, encompassing both formal and informal learning (Kukulska-Hulme, 2012; Rau et al., 2008; Ting, 2013; Viberg & Grönlund, 2013). Therefore, higher education instructors must integrate mobile technology, which is already widely used in formal education (Kukulska-Hulme, 2012).

Compared to computer-assisted language learning, MALL has demonstrated greater advantages in improving listening skills, speaking skills, vocabulary, and pronunciation (Anaraki, 2009; Hwang & Chen, 2013; Oberg & Daniels, 2013). As a crucial initial step in MALL education, instructors are urged to incorporate mobile

devices into the design of language courses (Cheon et al., 2012). In fact, scholars have increasingly highlighted the importance of MALL in the rapidly evolving world of knowledge and technology, advocating for innovative teaching methods in higher education to enhance learning outcomes (Oberg & Daniels, 2013; Sung et al., 2015; Tai, 2012). These innovations encompass various aspects, such as mobile learning systems tailored to learners' English vocabulary needs (Chen & Chung, 2008; Chen & Hsu, 2008; Hao et al., 2019; Huang et al., 2012) and personalized mobile English reading guides and cooperative reading systems tailored to individual proficiency levels and interests (Hsu et al., 2013; Lan et al., 2013; Lin, 2014).

Other approaches such as task-based learning, mobile phone apps, and learning management systems (e.g., Moodle and online learning platforms) have also been utilized to enhance the effectiveness of English language learning (Chuang, 2017; Gromik, 2012; Hwang & Chen, 2013; Jia et al., 2012; Sandberg et al., 2011). These diverse methodologies collectively contribute to the enrichment of English language instruction through MALL.

However, despite the pedagogical benefits of MALL, it has yet to be successfully implemented in English teaching primarily due to negative beliefs and barriers held by teachers (An & Williams, 2010; Chiu & Churchill, 2016; Ertmer et al., 2012; Judson, 2006; Kopcha, 2012) that hindered practical teaching. Other influential factors affecting the use of MALL include learners' behavior and attitude (Briz-Ponce et al., 2017; Hwang et al., 2008; Viberg & Grönlund, 2013), acceptance (Chen, 2017; Hong-Ren & Hui-Ling, 2010; Ma et al., 2005), readiness (Christensen & Knezek, 2017), anxiety level (Chiu & Churchill, 2016), as well as perceptions and usefulness (Chen, 2017; Hsieh & Tsai, 2017; Mumtaz, 2000; Zhao & Frank, 2003).

In today's interconnected global society, as mobile devices becoming more affordable and accessible, MALL holds the potential to transform traditional teaching methods. It empowers educators to create engaging and interactive learning experiences. To achieve success in MALL, it is crucial to utilize equipment that can provide learning resources and enable interaction and communication between teachers and learners, fostering independent or cooperative learning (Dye et al., 2003). In this study, successful MALL integration refers to the effective incorporation and utilization of a particular element or approach into an existing system or context. It implies that the integrated component or approach is seamlessly and efficiently merged with the pre-existing elements, leading to positive outcomes and achieving the desired goals or objectives. In addition, it should be noted that the success of MALL integration is highly associated with English as a foreign language (EFL) teachers' concerns, which much be addressed (Alnujaidi, 2021).

However, many teachers face challenges in effectively implementing MALL, despite recognizing its benefits (Chen, 2017). This resistance and low usage among some teachers highlighted the importance of teachers' ability to integrate mobile technology into their teaching practices (Hsieh & Tsai, 2017; Ryba & Brown, 2000). As MALL continues to face difficulties and challenges, addressing them becomes crucial (Al-Senaidi et al., 2009). Factors such as fear of transition, lack of time, fear of failure or incompetence, uncertainty about where to start, forced usage, and lack of access to equipment contribute to these challenges (Hartman et al., 2000). Two of the primary factors are teacher related. The first is intrinsic, which includes teachers' beliefs, lack of mobile technology skills, insufficient information literacy about technology, and reluctance to learn new technology, among others. The second is extrinsic, such as time pressure in teaching, inadequate preparation time for class, lack of sufficient training, and shortage of relevant equipment. (An & Williams, 2010; Ertmer, 1999, 2005; Ertmer et al., 1999, 2012; Judson, 2006; Kopcha, 2012; Lucas, 2018; Mumtaz, 2000). These situations undoubtedly cause teachers to minimize or even avoid the use of MALL, ultimately affecting students' learning outcomes (Crompton & Burke, 2018; Hamidi & Chavoshi, 2018).

To categorize the barrier factors hindering the use of computer technology, Ertmer (1999) proposed the earliest and most significant classification. Ertmer (1999) categorized these complex barrier factors into extrinsic and intrinsic factors. Extrinsic barriers, also referred to as first-order barriers, which are factors that impact teaching and organization. On the other hand, intrinsic factors are called second-order barriers, which are factors that affect the intention to use technology in teaching. Since then, the studies on barriers have followed Ertmer's (1999) classification, and some researchers have developed more sub-items based on this. Extrinsic factors, for instance, include insufficient equipment, lack of teaching resources, shortage of time, lack of curriculum integration, insufficient technological and scientific literacy, insufficient information and communication technology (ICT) skills, inadequate administrative and technological support, and lack of

encouragement and support from peers, parents, schools, and students (Al-Senaidi et al., 2009; Cuban, 2009; Davis & Falba, 2002; Ertmer et al., 2012; Hew & Brush, 2007; Kopcha, 2012; Mumtaz, 2000; Zhao & Frank, 2003).

For teachers to effectively incorporate technology into their teaching, they must address the extrinsic factors mentioned earlier. The absence of any of these factors can hinder the success of technology integration. While intrinsic factors are considered more influential, the role of extrinsic factors should not be overlooked (Ertmer, 1999). Even with prior experience in using technology, teachers may not utilize it without sufficient extrinsic support (Hu et al., 2003). Therefore, extrinsic support is critical for successful technology integration in teaching. The provision of equipment and administrative resources is essential for viable technology-assisted teaching. Without these resources, technology integration is likely to be hindered from the beginning (Ertmer, 1999).

In addition to extrinsic factors, teachers' intrinsic factors play a crucial role in using technology for teaching. Intrinsic factors, or second-order barriers, are the obstacles that hinder teachers from leveraging technology to enhance their teaching practices. These factors encompass various aspects such as teachers' technological knowledge and literacy, ability to incorporate ICT into teaching, personal attributes, motivation levels, beliefs, self-efficacy towards ICT, willingness to learn, attitude, anxiety related to technology, level of engagement, teaching skills and innovation, and knowledge of science and technology teaching. The degree of comfort and confidence in using technology is also an important intrinsic factor. These factors collectively hinder teachers from effectively utilizing technology for teaching purposes (Al-Senaidi et al., 2009; Buabeng-Andoh, 2012; Cuban, 2009; Davis & Falba, 2002; Hew & Brush, 2007; Kopcha, 2012; Mumtaz, 2000; Sung et al., 2015; Vongkulluksn et al., 2018; Zhao & Frank, 2003).

Based on the literature review, obstacles to incorporating technology into teaching are commonly categorized into extrinsic and intrinsic factors. Intrinsic factors, which encompass the previously mentioned factors, are generally considered more influential than first-order barriers. This study adopts the same classification system, categorizing the barriers to English teachers' MALL into two major groups: extrinsic and intrinsic factors. Extrinsic factors include accessibility, time, technical support and training, social and school culture, and student-related factors. On the other hand, intrinsic factors encompass teacher attitudes, beliefs, self-efficacy in integration, technological pedagogical content knowledge, and teaching techniques.

Currently, there is a noticeable disparity between technological advancements and the extent to which educators integrate technology into their teaching practices. Research indicates that teachers primarily utilize technology for administrative purposes, such as maintaining attendance and grade records, as well as for communication with colleagues and parents. The use of technology for preparing teaching materials follows suit (Ertmer, 2005; Gray et al., 2010).

In order to successfully incorporate technology in the classroom, professional development, administrative support, and teacher beliefs play pivotal roles (Inan & Lowther, 2010). Identifying the factors that hinder technology use and devising solutions to address them would alleviate teacher anxiety and enhance their confidence, ultimately leading to increased success in utilizing technology-assisted teaching methods in the classroom (Boulay & Fulford, 2009). Numerous studies have explored barriers to using educational technology, especially computer technology. However, the literature on barriers to the integration of MALL is relatively limited. Hence, this study investigated the aforementioned two factors pertaining to instructors' barriers to MALL integration. By doing so, it aimed to generate new knowledge and contribute to the existing literature, ultimately assisting in the formulation of strategies to encourage teachers to embrace modern technology in their teaching. The research questions centered around exploring the obstacles encountered by EFL instructors when integrating MALL at the university level and examining how their background characteristics influence these barriers.

METHOD

This research aimed to explore the barriers faced by university EFL instructors in Taiwan when incorporating MALL into their teaching. The study involved an extensive examination of pertinent literature, distribution of questionnaires to individual instructors, and subsequent analysis of the barriers, considering variations based on their background characteristics.

Table 1. Summary of participant characteristics

Variable	Category	n	Percentage (%)	Standard deviation
Gender	Male	108	30.9	.463
	Female	242	69.1	
Age	<30	3	0.9	.878
	31-39	37	10.6	
	40-49	148	42.3	
	50-59	113	32.3	
	>60	49	14.0	
Position	Lecturer	165	47.1	1.044
	Assistant professor	82	23.4	
	Associate professor	65	18.6	
	Professor	38	10.9	
Years of teaching	<5	21	6.0	1.698
	5-9	46	13.1	
	10-14	72	20.6	
	15-19	60	17.1	
	20-24	73	20.9	
	25-29	42	12.0	
	>30	36	10.3	
Location	Northern	155	44.3	.924
	Central	93	26.6	
	Southern	87	24.9	
	Eastern	15	4.3	
Time spend on MALL daily	0	9	2.5	1.032
	<1	106	30.3	
	1-2	158	45.1	
	3-4	51	14.6	
	5-6	15	4.3	
	>6	11	3.1	

Participants

The participants in this study were comprised of 350 EFL instructors from universities in various regions of Taiwan; their characteristics are presented in **Table 1**. The majority of the participants were female (69.1%). In terms of age, most participants were between 40 and 49 years old (42.3%), followed by between 50 and 59 (32.3%), more than 60 (14.0%), between 31 and 39 (10.6%), under 30 (0.9%). Regarding their job positions, 47.1% of participants were lecturers, 23.4% were assistant professors, 18.6% were associate professors, and 10.9% were full professors. In addition, most participants had more than 20 years of teaching experience (43.2%), 37.7% had between 10 to 19 years of teaching experience, and 19.1% had less than 10 years of teaching experience. Concerning the geographic distribution of universities, the majority of participants (44.3%) were from the northern area of Taiwan, followed by the central area (26.6%), southern area (24.9%), and only 4.3% were from the eastern area. Lastly, most participants reported using MALL between one to two hours (45.1%), while 32.8% used it for less than one hour, 14.6% between three to four hours, 4.3% between five to six hours, and 3.1% more than six hours per day.

Instrument

The survey questionnaire for university EFL instructors was developed from relevant literature. Specifically, Ertmer's (1999) classification of computer technology barriers, which distinguishes between intrinsic and extrinsic factors, was employed to develop subcategories and survey items. Extrinsic barriers, in this study, refer to the factors that impact teaching and organization when implementing MALL. These subcategories include accessibility, technical support and training, time, society and school culture, and student-related factors. Intrinsic factors, on the other hand, pertain to factors that affect an instructor's intention to use MALL in teaching. The subcategories here include attitude, belief, self-efficacy of integration, and technological pedagogical content knowledge and teaching technique.

A pilot study was then conducted to refine and finalize the items with the participation of 50 university EFL instructors who were not included in the main research sample. It then underwent reliability analysis, resulting in Cronbach's alpha scores of 0.966, indicating the high reliability of the survey.

Table 2. Reliability & validity estimates of instructors' barriers & coping strategies when implementing MALL

Category	Cronbach's alpha	Kaiser-Meyer-Olkin	Number of items
Barriers	.966	.945	48
Extrinsic	.922	.874	21
Intrinsic	.965	.959	27

In addition, validity analysis revealed a Kaiser-Meyer-Olkin validity score of 0.945, demonstrating high survey validity, as shown in **Table 2**. These results indicate that the study instrument was both reliable and valid.

After conducting a pilot study, the questionnaire was revised to suit the needs of this particular research. The modified questionnaire was then administered to a random sample of 350 university instructors from various areas across Taiwan. Furthermore, semi-structured interviews were conducted immediately after the survey with nine instructors. The final questionnaire is comprised of two main sections: MALL barrier (MB), consisting of a total of 48 questions and six demographic items. MB sections were divided into two domains, namely extrinsic and intrinsic factors. The extrinsic factors consisted of five subcategories: accessibility, technical support and training, time, social and school culture, and student-related factor. The intrinsic factors included four subcategories, namely attitude, belief, self-efficacy of integration, and technological pedagogical content knowledge.

Procedures and Data Analysis

Data collection for this study was done for over eight months. Initially, an email was sent to the participants with a brief overview of the study, along with a link to the survey site, which they could complete at their convenience. The purpose of the survey was clearly explained to the participants, and they were assured of the privacy and confidentiality of their information. The data collected in this study were used solely for research purposes and would be retained for a maximum of three years. Once all the surveys were completed, the responses were analyzed using statistical coding, allowing for comparisons and insights into the participants' MB. Quantitative data were then analyzed using descriptive statistical procedures, t-tests, and one-way ANOVAs to determine any significant differences in the participants' reported barriers regarding the implementation of MALL based on their demographic characteristics such as gender, age, position, years of teaching, location of the university, and daily academic MALL integration hours. To examine MBs reported by the participants, three levels were used to identify these barriers: high (mean score of two or lower), medium (mean score of 2.1-4.0), and low (mean score of 4.1 or higher). These benchmarks made the comparison of the participants' MBs and coping strategies effective. The qualitative data were finally analyzed using the content analysis method as suggested by Neuendorf (2017). A coding scheme outlining the themes, which aligned with the research objective, was created to analyze the data. Throughout the process, initial observations, potential themes, or emerging patterns from the data were noted. Subsequently, appropriate codes or categories reflecting the presented content or themes were assigned to each interview response for the purpose of interpreting the findings of the participants' MBs and coping strategies.

RESULTS

EFL Instructors' Barriers to MALL Integration

Table 3 presents the results of the survey conducted to identify the barriers faced by university EFL instructors while integrating MALL from their perspective. The mean score of individual barrier items ranged from 2.17 to 5.11 for the participants, with an overall mean of 3.13. This indicates a moderate level of barriers to the integration of MALL according to the criteria established above. Thus, it can be inferred that most EFL instructors face some barriers while integrating MALL. Interestingly, the survey results show that the participants reported facing more extrinsic barriers (mean [M]=3.34) than intrinsic barriers (M=2.97) when it comes to using mobile technology for language learning. One major challenge is the fast-paced updates in technology, which demand a significant amount of time and effort to learn and achieve leverage effectively (M=5.11). In addition, the participants indicated that neither the government (M=3.81) nor the university (M=3.55) actively encourages the use of MALL.

Table 3. Reported barriers to MALL integration

Domain/subcategory	Item	M	SD
Extrinsic barrier		3.34	.9356
ACC 01	Insufficient personally-owned MALL equipment	2.68	1.690
ACC 02	Insufficient personally-owned MALL software	3.10	1.538
ACC 03	Insufficient MALL equipment from my university	3.49	1.649
ACC 04	Insufficient MALL software from my university	3.47	1.574
ACC 05	Internet connection is slow or unstable in the classroom	3.66	1.612
TEC 01	Lack of adequate MALL support from my university	3.45	1.578
TEC 02	Lack of MALL training from my university	3.45	1.539
TEC 03	The MALL training offered is not suitable	2.77	1.350
TIM 01	Mobile technology updates rapidly and takes time to keep learning	5.11	1.190
TIM 02	Lack of time to learn MALL	3.21	1.457
TIM 03	Lack of time to integrate MALL	3.18	1.427
TIM 04	Lack of time to develop innovative MALL	3.77	1.644
SCO 01	The Government does not actively encourage MALL	3.81	1.471
SCO 02	My university does not actively encourage MALL	3.55	1.520
SCO 03	No intention to use MALL due to pressure from my workload	3.67	1.668
SCO 04	My colleagues around me do not have the habit of using MALL	3.43	1.536
SCO 05	No way to share and learn from other teachers about MALL	3.45	1.598
STU 01	Students feel that MALL cannot improve learning outcomes	2.88	1.322
STU 02	Students feel that MALL cannot increase learning motivation	2.93	1.400
STU 03	Students' acceptance of MALL is low	2.56	1.267
STU 04	Students feel that using MALL in the classroom is a waste of time	2.52	1.239
Intrinsic factor		2.97	1.067
ATT 01	I am anxious about using MALL	2.79	1.450
ATT 02	I do not think MALL is better than traditional classroom teaching	3.27	1.540
ATT 03	Using MALL in classroom teaching is a waste of time	2.47	1.313
ATT 04	Using MALL will increase my workload	3.63	1.619
BEL01	I can still teach well without using mobile technology	4.51	1.349
BEL02	Students' use of mobile devices in class disrupts class	3.27	1.578
BEL03	MALL does not improve students' learning outcomes	2.89	1.435
BEL04	MALL does not increase students' learning motivation	2.88	1.486
BEL05	MALL does not increase student learning engagement	2.84	1.539
BEL06	MALL does not lead students to self-learning	3.07	1.554
BEL07	Mobile technology will not improve communication between teachers and students	3.16	1.606
BEL08	MALL cannot replace traditional classroom teaching	4.31	1.511
SEL 01	I do not know how to operate MALL	2.17	1.253
SEL 02	It is difficult to integrate MALL into teaching	2.79	1.383
SEL 03	I do not know how to provide individual student learning feedback through mobile technology	2.39	1.389
SEL 04	I do not know how to use mobile technology to analyze students' learning outcomes	2.67	1.487
SEL 05	Using mobile technology to communicate with students is difficult	2.48	1.368
SEL 06	Using mobile technology for student assessment is difficult	2.80	1.545
SEL 07	I do not know how to guide students to use mobile technology appropriately	2.57	1.315
SEL 08	I do not know how to use mobile technology to supervise students in classroom learning activities	2.91	1.557
TPCK 01	I do not know how to use mobile technology to assist students of different ages & backgrounds	2.82	1.380
TPCK 02	I do not know which mobile technology to choose for teaching in my classroom	2.90	1.543
TPCK 03	I do not know how to arrange the classroom environment for MALL	3.01	1.515
TPCK 04	I do not know how to do classroom management with mobile technology	2.97	1.481
TPCK 05	I do not know which mobile technology to use to enhance my teaching content.	2.79	1.477
TPCK 06	I do not know which mobile technology to use to enhance my classroom teaching skills	2.83	1.474
TPCK 07	I do not know which mobile technology to use to improve students' learning outcomes	2.96	1.519
Total		3.13	.9182

Note. ACC: Accessibility; TEC: Technical support & training; TIM: Time; SCO: Social & school culture; STU: Student-related factor; ATT: Attitude; BEL: Belief; SEL: Self-efficacy of integration; TPCK: Technological pedagogical content knowledge; M: Mean & SD: Standard deviation

Table 4. Independent t-test results

	Male		Female		t	p
	Mean	Standard deviation	Mean	Standard deviation		
Barrier	3.1316	.87703	3.1317	.93776	-.001	.129

Note. n=350; df=348; & p<.05

They also mentioned that their struggle to find time to develop innovative MALL approaches (M=3.77) and the pressure they feel from their workload make it difficult to consider MALL (M=3.67). Regarding intrinsic barriers, the participants believed that they could still teach effectively without using mobile technology (M=4.51) and that MALL cannot entirely replace traditional classroom teaching (M=4.31). They also noted that using MALL may increase their workload (M=3.63), posing an additional obstacle to adoption.

Furthermore, the interviews with the instructors provided additional insights that supported the existence of two barriers mentioned above. Multiple participants expressed the challenges they faced in keeping up with the ever-evolving landscape of mobile technology. They emphasized that staying updated with the latest advancements and determining which specific technologies to use and when posed significant difficulties. This lack of clarity and confidence in choosing the appropriate tools and platforms for MALL implementation emerged as a major obstacle. Consequently, some instructors reported feeling demotivated to embrace MALL in their EFL teaching practices. Their concerns regarding mobile technology selection and utilization underscored the complexity and decision-making burden associated with integrating mobile technology into EFL instruction. These findings highlight the need for support, training, and resources to assist instructors in navigating the rapidly changing mobile technological landscape and alleviating their hesitation towards adopting MALL. In addition, during the interviews, several participants explicitly emphasized the lack of time as a significant barrier to engage in MALL activities and incorporate them into their daily routines. This emerged as the second most prominent challenge mentioned by the participants. The participants accentuated that their busy schedules and various commitments made it difficult for them to allocate sufficient time for MALL, hindering their ability to fully embrace and benefit from this language teaching tool. Their perspectives shed light on the practical constraints faced by individuals when attempting to integrate MALL into their language learning endeavors.

Individual Differences on Barriers of MALL Integration Among EFL Instructors

As illustrated in **Table 4**, there was no significant difference between female and male instructors' barriers to MALL integration. This means that both female and male instructors had similar challenges and barriers when integrating MALL into their teaching practices.

As shown in **Table 5**, there were significant differences among instructors in terms of time spent on MALL daily in their barriers. Instructors who did not use MALL at all reported the highest level of barriers (M=3.93), while those who spent more than six hours daily on MALL reported experiencing the least number of barriers (M=2.57). However, there were no significant differences among instructors in terms of years of teaching experience or location of the university. This means that regardless of their experience or the university they work at, instructors face similar challenges when integrating MALL into their teaching practices.

DISCUSSION

The results of this study indicate the importance of identifying the barriers that instructors encounter when integrating MALL. Merely urging instructors to integrate MALL without providing the necessary support and resources is insufficient. Time seems to be the key to the success of MALL integration at this stage. Participants in the study reported that universities need to reduce instructors' workload to allow them more time for MALL integration, as keeping up with the rapidly evolving mobile technology is challenging. Related studies also supported the finding that time is a crucial factor in successful technology integration in education. For example, a study by Liang (2021) found that teachers' time constraints were a significant barrier to technology integration in Chinese classrooms.

Moreover, it appears that the participants lack sufficient technological tools for MALL, and universities do not provide adequate equipment, software, or appropriate training. Studies have shown that offering support and resources to instructors is essential for successful technology integration. For instance, Nikolopoulou

Table 5. ANOVA results

	Source	SS	df	MS	F	Sig.
Age	Between	4.539	4	1.135	1.351	.251
	Within	289.699	345	.840		
	Total	294.238	349			
Position	Between	.248	3	.083	.097	.961
	Within	293.990	346	.850		
	Total	294.238	349			
Years of teaching experience	Between	.898	6	.150	.175	.983
	Within	293.340	343	.855		
	Total	294.238	349			
Area	Between	3.147	3	1.049	1.247	.293
	Within	291.091	346	.841		
	Total	294.238	349			
Time spent on MALL daily	Between	33.553	5	6.711	8.855	.000*
	Within	260.685	344	.758		
	Total	294.238	349			

Note. Sig.: Significance & *p<.05

(2020) study in Greek revealed that the lack of equipment and current legislation were the most significant barriers to integrating mobile technology into teaching practices. Similarly, a study by Nikolopoulou et al. (2023) found that lack of resources and support, as well as class conditions, were the most vital barrier factors that affect teachers' ability to integrate mobile technology into their teaching practices.

The study also found instructors who did not use MALL at all reported the highest level of barriers, while those who spent more than six hours daily on MALL experienced the least number of barriers. Spending more time on MALL may have helped instructors become more proficient and comfortable with using MALL. Those who spent more than six hours daily on MALL also reported using coping strategies most frequently, indicating that they were more likely to use effective strategies to overcome barriers. Conversely, those who spent no time on MALL reported using coping strategies least frequently, suggesting they may not have had the necessary skills or knowledge to cope with MALL integration challenges.

Fortunately, most instructors recognize the advantages of MALL and try to integrate it into their teaching. Now that we understand the barriers that most university EFL instructors face, further studies should focus on how the government and universities can assist the instructors and further improve their MALL integration. It is also recommended that further research use qualitative methods to have a more in-depth investigation of instructors' barriers to MALL integration, particularly the specific barriers they face in the early stages of MALL integration and how to overcome them.

CONCLUSIONS

This study aimed to identify the barriers encountered by university EFL instructors when integrating MALL into their teaching. The results indicated that instructors faced moderate levels of barriers. Gender, years of experience, and the university's location did not show significant differences in barriers related to MALL integration for EFL instructors. These findings indicated that regardless of gender, level of experience, or where the university is located, instructors can benefit from similar types of support and resources to facilitate successful MALL integration. On the other hand, age, position, and time spent on MALL daily showed significant differences in coping strategies used by instructors during MALL integration.

In summary, this study highlights the importance of identifying barriers and providing instructors with the necessary support and resources to overcome them. Reducing instructors' workload is a crucial step in facilitating MALL integration, as time constraint seems to be a significant barrier. By developing effective coping strategies and offering support and resources, educators can overcome related challenges and maximize the benefits of MALL for language learning. Universities and governments should focus on providing ongoing support, training, and resources to instructors to improve their MALL integration and ultimately enhance students' language learning outcomes.

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REFERENCES

Alnujaidi, S. (2021). Adoption of mobile assisted language learning (MALL) in Saudi Arabian EFL classrooms. *Journal of Language Teaching and Research, 12*(2), 312-323. https://doi.org/10.17507/jltr.1202.13

Al-Senaidi, S., Lin, L., & Poirot, J. (2009). Barriers to adopting technology for teaching and learning in Oman. *Computers & Education, 53*(3), 575-590. https://doi.org/10.1016/j.compedu.2009.03.015

An, Y.-J., & Williams, K. (2010). Teaching with web 2.0 technologies: Benefits, barriers and lessons learned. *International Journal of Instructional Technology and Distance Learning, 7*(3), 41-58.

Anaraki, F. B. (2009). A flash-based mobile learning system for learning English as second language. In *Proceedings of the International Conference on Computer Engineering and Technology* (pp. 400-404). IEEE. https://doi.org/10.1109/ICCET.2009.183

Boulay, R. A., & Fulford, C. P. (2009). Technology mentoring: Research results across seven campuses. In A. Tatnall, & A. Jones (Eds.), *Proceedings of the 9th IFIP TC 3 World Conference on Computers in Education* (pp. 273-281). Springer. https://doi.org/10.1007/978-3-642-03115-1_29

Briz-Ponce, L., Pereira, A., Carvalho, L., Juanes-Méndez, J. A., & García-Peñalvo, F. J. (2017). Learning with mobile technologies–Students' behavior. *Computers in Human Behavior, 72*, 612-620. https://doi.org/10.1016/j.chb.2016.05.027

Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology, 8*, 136-155.

Chen, C. M., & Chung, C. J. (2008). Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle. *Computers & Education, 51*(2), 624-645. https://doi.org/10.1016/j.compedu.2007.06.011

Chen, C. M., & Hsu, S. H. (2008). Personalized intelligent mobile learning system for supporting effective English learning. *Educational Technology & Society, 11*(3), 153-180.

Chen, K. T.-C. (2017). Examining EFL instructors' and students' perceptions and acceptance toward M-learning in higher education. *Universal Access in the Information Society, 16*(4), 967-976. https://doi.org/10.1007/s10209-016-0494-8

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers & Education, 59*(3), 1054-1064. https://doi.org/10.1016/j.compedu.2012.04.015

Chiu, T. K. F., & Churchill, D. (2016). Adoption of mobile devices in teaching: Changes in teacher beliefs, attitudes and anxiety. *Interactive Learning Environments, 24*(2), 317-327. https://doi.org/10.1080/10494820.2015.1113709

Christensen, R., & Knezek, G. (2017). Readiness for integrating mobile learning in the classroom: Challenges, preferences and possibilities. *Computers in Human Behavior, 78*, 379-388. https://doi.org/10.1016/j.chb.2017.07.046

Chuang, Y.-T. (2017). MEMIS: A mobile-supported English-medium instruction system. *Telematics and Informatics, 34*(2), 640-656. https://doi.org/10.1016/j.tele.2016.10.007

Crompton, H., & Burke, D. (2018). The use of mobile learning in higher education: A systematic review. *Computers & Education, 123*, 53-64. https://doi.org/10.1016/j.compedu.2018.04.007

Cuban, L. (2009). *Oversold and underused computers in the classroom*. Harvard University Press. https://doi.org/10.2307/j.ctvk12qnw

Davis, K. S., & Falba, C. J. (2002). Integrating technology in elementary preservice teacher education: Orchestrating scientific inquiry in meaningful ways. *Journal of Science Teacher Education, 13*(4), 303-329. https://doi.org/10.1023/A:1022535516780

Dye, A., Solstad, B. E., K., & Odingo, J. A. (2003). Mobile education–A glance at the future. *NKI Nettstudier*. http://nettskolen.nki.no/forskning/mobile_education.pdf

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47-61. https://doi.org/10.1007/bf02299597

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development, 53*(4), 25-39. https://doi.org/10.1007/bf02504683

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-435. https://doi.org/10.1016/j.compedu.2012.02.001

Ertmer, P. A., Paul, A., Molly, L., Eva, R., & Denise, W. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32*(1), 54-72. https://doi.org/10.1080/08886504.1999.10782269

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education, 19*, 18-26. https://doi.org/10.1016/j.iheduc.2013.06.002

Gray, L., Thomas, N., & Lewis, L. (2010). *Teachers' use of educational technology in US public schools: 2009 (NCES 2010-040)*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Gromik, N. A. (2012). Cell phone video recording feature as a language learning tool: A case study. *Computers & Education, 58*(1), 223-230. https://doi.org/10.1016/j.compedu.2011.06.013

Hamidi, H., & Chavoshi, A. (2018). Analysis of the essential factors for the adoption of mobile learning in higher education: A case study of students of the University of Technology. *Telematics and Informatics, 35*(4), 1053-1070. https://doi.org/10.1016/j.tele.2017.09.016

Hao, Y., Lee, K. S., Chen, S.-T., & Sim, S. C. (2019). An evaluative study of a mobile application for middle school students struggling with English vocabulary learning. *Computers in Human Behavior, 95*, 208-216. https://doi.org/10.1016/j.chb.2018.10.013

Hartman, J., Dziuban, C., & Moskal, P. (2000). Faculty satisfaction in ALNs: A dependent or independent variable? *Journal of Asynchronous Learning Networks, 4*(3), 155-179. https://doi.org/10.24059/olj.v4i3.1892

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252. https://doi.org/10.1007/s11423-006-9022-5

Hong-Ren, C., & Hui-Ling, H. (2010). User acceptance of mobile knowledge management learning system: Design and analysis. *Journal of Educational Technology & Society, 13*(3), 70-77.

Hsieh, W.-M., & Tsai, C.-C. (2017). Taiwanese high school teachers' conceptions of mobile learning. *Computers & Education, 115*, 82-95. https://doi.org/10.1016/j.compedu.2017.07.013

Hsu, C.-K., Hwang, G.-J., & Chang, C.-K. (2013). A personalized recommendation-based mobile learning approach to improving the reading performance of EFL students. *Computers & Education, 63*, 327-336. https://doi.org/10.1016/j.compedu.2012.12.004

Hu, P. J.-H., Clark, T. H. K., & Ma, W. W. (2003). Examining technology acceptance by schoolteachers: A longitudinal study. *Information & Management, 41*(2), 227-241. https://doi.org/10.1016/s0378-7206(03)00050-8

Huang, Y. M., Huang, Y. M., Huang, S. H., & Lin, Y. T. (2012). A ubiquitous English vocabulary learning system: Evidence of active/passive attitudes vs. usefulness/ease-of-use. *Computers & Education, 58*(1), 273-282. https://doi.org/10.1016/j.compedu.2011.08.008

Hwang, G. J., Tsai, P. S., Tsai, C. C., & Tseng, J. C. R. (2008). A novel approach for assisting teachers in analyzing student web-searching behaviors. *Computers & Education, 51*(2), 926-938. https://doi.org/10.1016/j.compedu.2007.09.011

Hwang, W.-Y., & Chen, H. S. L. (2013). Users' familiar situational contexts facilitate the practice of EFL in elementary schools with mobile devices. *Computer Assisted Language Learning, 26*(2), 101-125. https://doi.org/10.1080/09588221.2011.639783

Inan, F. A., & Lowther, D. L. (2010). Laptops in the K-12 classrooms: Exploring factors impacting instructional use. *Computers & Education, 55*(3), 937-944. https://doi.org/10.1016/j.compedu.2010.04.004

Jia, J., Chen, Y., Ding, Z., & Ruan, M. (2012). Effects of a vocabulary acquisition and assessment system on students' performance in a blended learning class for English subject. *Computers & Education, 58*(1), 63-76. https://doi.org/10.1016/j.compedu.2011.08.002

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education, 14*, 581-597.

Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education, 59*(4), 1109-1121. https://doi.org/10.1016/j.compedu.2012.05.014

Kukulska-Hulme, A. (2012). How should the higher education workforce adapt to advancements in technology for teaching and learning? *The Internet and Higher Education, 15*(4), 247-254. https://doi.org/10.1016/j.iheduc.2011.12.002

Lan, K., Sung, Y.-T., & Chang, K. (2013). From particular to popular: Facilitating EFL mobile-supported cooperative reading. *Language Learning and Technology, 17*, 23-38.

Liang, W. (2021). University teachers' technology integration in teaching English as a foreign language: Evidence from a case study in mainland China. *SN Social Sciences, 1*(8), 219. https://doi.org/10.1007/s43545-021-00223-5

Lin, C.-C. (2014). Learning English reading in a mobile-assisted extensive reading program. *Computers & Education, 78*, 48-59. https://doi.org/10.1016/j.compedu.2014.05.004

Lucas, M. (2018). External barriers affecting the successful implementation of mobile educational interventions. *Computers in Human Behavior, 107*, 105509. https://doi.org/10.1016/j.chb.2018.05.001

Ma, W. W. K., Andersson, R., & Streith, K. O. (2005). Examining user acceptance of computer technology: An empirical study of student teachers. *Journal of Computer Assisted Learning, 21*(6), 387-395. https://doi.org/10.1111/j.1365-2729.2005.00145.x

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of the literature. *Journal of Information Technology for Teacher Education, 9*(3), 319-342. https://doi.org/10.1080/14759390000200096

Neuendorf, K. A. (2017). *The content analysis guidebook*. SAGE. https://doi.org/10.4135/9781071802878

Nikolopoulou, K. (2020). Secondary education teachers' perceptions of mobile phone and tablet use in classrooms: Benefits, constraints and concerns. *Journal of Computers in Education, 7*(2), 257-275. https://doi.org/10.1007/s40692-020-00156-7

Nikolopoulou, K., Gialamas, V., & Lavidas, K. (2023). Mobile learning-technology barriers in school education: Teachers' views. *Technology, Pedagogy and Education, 32*(1), 29-44. https://doi.org/10.1080/1475939X.2022.2121314

Oberg, A., & Daniels, P. (2013). Analysis of the effect a student-centered mobile learning instructional method has on language acquisition. *Computer Assisted Language Learning, 26*(2), 177-196. https://doi.org/10.1080/09588221.2011.649484

Rau, P.-L. P., Gao, Q., & Wu, L.-M. (2008). Using mobile communication technology in high school education: Motivation, pressure, and learning performance. *Computers & Education, 50*(1), 1-22. https://doi.org/10.1016/j.compedu.2006.03.008

Ryba, K., & Brown, M. E. (2000). How proficient IT teachers integrate computers into the curriculum. *Journal of Computing in Teacher Education, 16*(4), 6-11.

Sandberg, J., Maris, M., & de Geus, K. (2011). Mobile English learning: An evidence-based study with fifth graders. *Computers & Education, 57*(1), 1334-1347. https://doi.org/10.1016/j.compedu.2011.01.015

Shuib, L., Shamshirband, S., & Ismail, M. H. (2015). A review of mobile pervasive learning–Applications and issues. *Computers in Human Behavior, 46*, 239-244. https://doi.org/10.1016/j.chb.2015.01.002

Stockwell, G. (2007). Vocabulary on the move: Investigating an intelligent mobile phone-based vocabulary tutor. *Computer Assisted Language Learning, 20*(4), 365-383. https://doi.org/10.1080/09588220701745817

Sung, Y.-T., Chang, K.-E., & Yang, J.-M. (2015). How effective are mobile devices for language learning? A meta-analysis. *Educational Research Review, 16*, 68-84. https://doi.org/10.1016/j.edurev.2015.09.001

Tai, Y. (2012). Contextualizing a MALL: Practice design and evaluation. *Educational Technology and Society, 15*(2), 220-230.

Ting, Y.-L. (2013). Using mobile technologies to create interwoven learning interactions: An intuitive design and its evaluation. *Computers & Education, 60*(1), 1-13. https://doi.org/10.1016/j.compedu.2012.07.004

Viberg, O., & Grönlund, Å. (2013). Cross-cultural analysis of users' attitudes toward the use of mobile devices. *Computers & Education, 69*, 169-180. https://doi.org/10.1016/j.compedu.2013.07.014

Vongkulluksn, V. W., Xie, K., & Bowman, M. A. (2018). The role of value on teachers' internalization of external barriers and externalization of personal beliefs for classroom technology integration. *Computers & Education, 118*, 70-81. https://doi.org/10.1016/j.compedu.2017.11.009

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal, 40*(4), 807-840. https://doi.org/10.3102/00028312040004807

Zurita, G., & Nussbaum, M. (2007). A conceptual framework based on activity theory for mobile CSCL. *British Journal of Educational Techn'ology, 38*(2), 211-235. https://doi.org/10.1111/j.1467-8535.2006.00580.x