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University Students' Opinions about Mobile Learning: A Qualitative Meta-Synthesis by ENTREQ Statement (2000-2020)

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Abstract

The place and significance of technology in education concerning concepts like e-learning, mobile learning, distance learning, and flipped classroom have been the focus of research for a long time. Moreover, during the recent pandemic due to Covid-19 outbreak in the world, the distance education model turned up as an alternative to traditional face-to-face education system. Above all, most universities worldwide have adopted distance education, and the use of mobile technologies has become a requirement. This way, the importance of mobile learning has become all the more evident. This study aimed to interpret and discuss the findings of existing qualitative research into university students' mobile learning practices and reasons behind why they do or do not prefer mobile learning, by employing a systematic method of research, that is, meta-synthesis. As a result of this meta-synthesis research (N = 10), the university students' reasons for preferring mobile learning were classified as educational reasons, reasons regarding communication, making life easier, and belief. On the other hand, their reasons for not preferring mobile learning were classified under the categories of technical problems, economic problems, ergonomic problems, belief, and reliance on face-to-face education. Besides yielding similar results to those in the literature, this study drew attention to creating opportunities for using educational mobile learning applications, the issue of personal data security, and the educators' resistance to technology. It was also concluded that a two-way understanding of mobile learning existed, i.e., it was regarded as saving or wasting time.

Key words: *meta-synthesis; mobile learning; qualitative findings; university students.*

Introduction

The initial paragraphs of most articles on instructional technologies begin with expressions like *in the developing world, in the rapidly changing world, to quickly access knowledge,* etc. The instructional technology of focus in each of these expressions is in fact mobile learning (m-learning). M-learning plays an important role not only in keeping pace with the advancements and changes in the world but also in continuing the provision of education even during times like the recent pandemic. The evolution of handheld portable devices and wireless technology has resulted in radical changes in the social and economic lifestyles of modern people. Today many technological devices are produced in portable form and people have become accustomed to them (El-Hussein & Cronje, 2010). Advancements in mobile technology are rapidly widening the scope of learning in areas outside of formal education (i.e., informal learning) by allowing flexible and instant access to rich digital resources. M-learning can also play a significant supplemental role within formal education. The potential benefits of m-learning have been widely touted for a range of purposes, including cost savings, ubiquitous communication, study aids, and location-based services (Cheon et al., 2012). On the whole, the ease of access to m-learning devices, the presence of a worldwide wireless communication network, the proliferation of programs and software for mobile devices, and the fact that Z generation students' learning with technological agents is easier and more fun might be the factors behind widespread adoption of m-learning.

The spread of mobile technologies, particularly mobile phones, has been swift in both developed and developing countries (Kaliisa & Palmer, 2019). With the proliferation of mobile computing technology, m-learning will play a vital role in the rapidly growing electronic learning market. M-learning is the delivery of learning to students anytime and anywhere through the use of wireless Internet and mobile devices (Wang et al., 2009). The term mobile refers to the possibility of occurrence in multiple locations, across multiple times, and addressing multiple content areas using either static or portable equipment such as wireless laptops, Personal Digital Assistants (PDAs) and smart phones (Sarrab et al., 2012). By utilising m-learning, college students can use their spare time while commuting to prepare for their classes by engaging with learning materials on an online learning platform (Yang et al., 2019).

The number of students who have mobile devices is also growing. Furthermore, some universities provide students with smart phones in order for them to utilise free and constructive learning management systems (LMS) for m-learning. This trend is expected to continue and expand as the price of smart phones and telecommunication costs has decreased. Therefore, it is necessary to conduct research that deals more intensively with university students' intention to use m-learning in order to provide basic information for establishing m-learning support systems for learners (Park et al., 2012). M-learning is a natural extension of e-learning. It has the potential to

additionally extend the time, place and way of student learning and performance in all aspects of their lives. The benefits of m-learning are as follows (Sarrab et al., 2012):

- access to content regardless of time
- access to content regardless of place
- support to distance learning
- enhancement of student-centred learning
- suitability for just-in-time training or review of content
- more effective use for the differently-abled
- differentiation of student learning according to their needs, and personalized learning
- enhanced interaction between students themselves, and among learners and instructors
- reduction of cultural and communication barriers between members of the faculty and students by using communication channels that students like.

While m-learning has the potential to support all forms of education, higher education is a particularly appropriate venue for the integration of student-centred m-learning because mobile devices have become ubiquitous on college campuses. Various m-learning attempts have been applied in higher education (Cheon et al., 2012). Despite the tremendous growth and potential of the devices and networks, wireless e-learning and m-learning is still in its infancy and embryonic stage, and the promise of instant access to learning anytime and anywhere is an enormous benefit, but will be restricted until the technology of wireless data access matures and educators learn how to apply appropriate pedagogies from both social-constructivist and conversational theories mentioned earlier (Motiwalla, 2007). Many university teachers, uncomfortable with their own use of technology, feel somewhat threatened by these new forms of communication, knowing that in many cases their students are more technology-competent than they are (Herrington & Herrington, 2007). M-learning has growing visibility and significance in higher education. Nevertheless, mobile education, however innovative, technically feasible and pedagogically sound, may have no chance of sustained, wide-scale institutional deployment in higher education in the foreseeable future, at a distance or on site (Traxler, 2007).

Although many research findings in the literature indicate that m-learning has gained significance and is widely adopted in higher education (Cheon et al., 2012; Nassuora, 2013), some studies report that m-learning has not yet reached an expected level of efficiency (Traxler, 2007), that the technological infrastructure and development level of the countries negatively affects the process (Kaliisa & Palmer, 2019), and that m-learning systems are inadequate (Al-Emran, Elsherif & Shaalan, 2016). This study aimed to investigate the higher education students' views on m-learning through a meta-synthesis on an international level. It is thought that the comparison and examination of existing findings reported by researchers concerning student views on m-learning

in the literature may contribute to the field. The main research question was, 'What are the views of university students with m-learning experiences about m-learning?' Besides, the subquestions were developed as:

– What are the reasons why university students prefer m-learning?
– What are the reasons why university students do not prefer m-learning?

Method

Research design

This study used a meta-synthesis method of research grounded on the synthesis of existing research that reported qualitative data. Although meta-synthesis is widely used in health sciences, this method has also begun to gain significance in educational sciences in recent years. According to Walsh and Downe (2005), meta-synthesis of qualitative studies attempts to integrate results from a number of different but interrelated qualitative studies, and the technique has an interpretive rather than cumulative intent, in contrast to meta-analysis of quantitative studies.

As for the requirement of the meta-synthesis method defined above, the present study attempted to investigate university students' views on m-learning, difficulties they face in m-learning, and reasons for their preference of m-learning via synthesizing qualitative data from primary sources. Given that a quality meta-synthesis begins with a good research question, relevant literature regarding the use of mobile technology in higher education was reviewed at the outset to determine the aim of this study. As a result of the literature review, the focus was placed on the reasons why university students who have experienced m-learning in higher education do or do not prefer m-learning, so the research question was formulated. A comprehensive review of literature was then carried out using the key concepts of "e-learning", "mobile learning", "views about e-learning", and "views about mobile learning". Studies retrieved through literature search were screened against the inclusion and exclusion criteria and thereby 10 studies were included in the meta-synthesis. The quality assessments of included studies were carried out by two experts using CASP, and inter-coder reliability was determined using the Krippendorff's alpha coefficient.

The researchers repeatedly read each study in a comparative order to reveal direct statements of university students regarding why they do or do not prefer m-learning and to reveal the interpretive statements of the authors of source studies regarding the preference and non-preference of m-learning. Similar findings derived from these studies were abstracted by aggregating and calculating the frequency effect size of each finding. This was done to make a more comprehensive interpretation of the findings by determining their prevalence and importance. Finally, new and common themes derived from the synthesis of the studies were developed. This research was carried out based on the following steps used in the meta-synthesis method.

According to Erwin et al. (2011), the qualitative meta-synthesis research process is summarized in six steps and gives a basic description of the qualitative meta-synthesis

process with examples drawn from the literature. The six steps of qualitative meta-synthesis research process are:

Step 1. Formulate a clear research problem and question
Step 2. Conduct a comprehensive literature search
Step 3. Conduct careful appraisal of research studies for possible inclusion
Step 4. Select and conduct meta-synthesis techniques to integrate and analyse qualitative research findings
Step 5. Present the synthesis of findings across studies
Step 6. Reflect on the process

Step 1. Formulate a clear research problem and question: clear presentation of the research problem in meta-synthesis studies is of primary importance for the comprehensibility of findings and error-free enactment of forthcoming procedures. Hence, the problem was divided into two parts in order to make the analysis easier and more comprehensible. University students' reasons for preferring m-learning after experiencing it were analysed in the first part and their reasons for not preferring it in the second.

Step 2. Conduct a comprehensive literature search: *Google Scholar, ERIC, ProQuest* and *ResearchGate* databases were searched for relevant qualitative studies in the set period between the years 2000-2020. The rationale for choosing the year 2000 as the starting point of the study was that it marked the beginning of research on m-learning and e-learning (McConatha et al., 2008). Keywords such as "e-learning", "mobile learning", "views on e-learning", and "views on mobile learning" were used in the search.

Step 3. Conduct careful appraisal of research studies for possible inclusion: After applying the inclusion and exclusion criteria (given in Table 1) of the current meta-synthesis study, 10 studies were included in the synthesis (Figure 1). Given that meta-synthesis studies require an in-depth analysis and rich interpretation, it is recommended to limit them to around 10-12 studies (Bondas & Hall, 2007).

Table 1
Inclusion and exclusion criteria of the studies

Inclusion Criteria	Exclusion Criteria
a) Qualitative or mixed-methods research b) Studies involving direct expressions of participants c) Studies investigating university students' views on m- learning d) Full text articles or theses e) Studies in prestigious and scientific indexes or databases f) Studies published between 2000 and 2020 g) Studies in which students have experienced m-learning	a) Studies that provide only quantitative data b) Studies in the form of literature review c) Non-English studies d) Studies investigating university students' views with no experience of m-learning

The inclusion and exclusion criteria shown in Table 1 were set by the authors considering the principles of the meta-synthesis method and the peculiarities of the current study's focus. Studies reporting qualitative data based on university students' views on m-learning after their experience of m-learning published in prestigious and academic journals between the years 2000-2020 were selected for the meta-synthesis. However, studies including only quantitative data, review studies, studies including students' views on m-learning with no prior experience of m-learning, and studies written in languages other than English were excluded. Figure 1 shows the flow chart of the inclusion process.

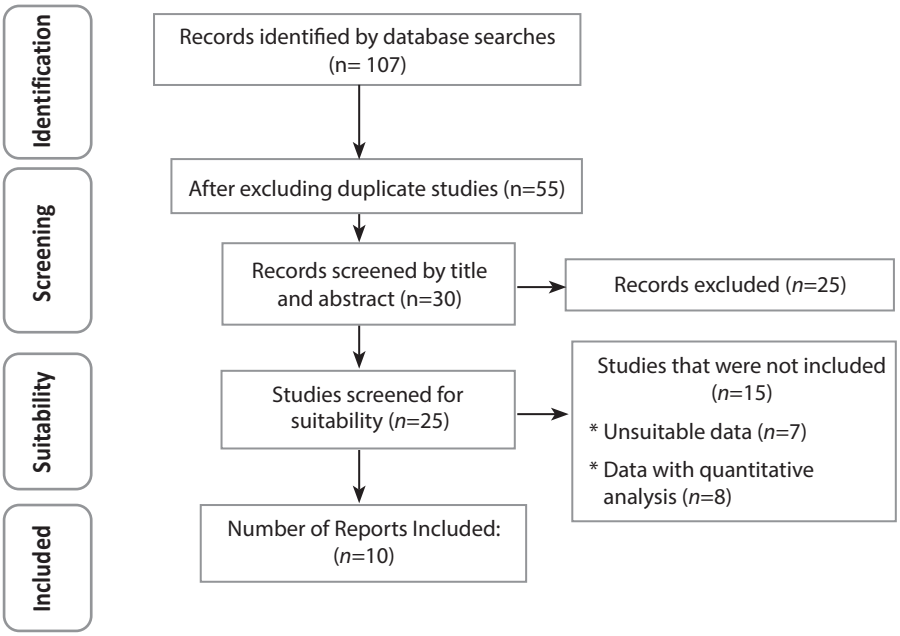

Figure 1. The flow of information through different phases of systematic review

A total of 107 studies were identified as per the inclusion criteria. However, 97 studies with no full-text available in databases, conference proceedings, studies with only quantitative data analysis, and studies having unsuitable data were excluded from the process. Following the stages developed via Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) Statement for the systematic reviews, 10 studies were included for the meta-synthesis analysis.

Appraising the quality of articles is an important stage of this process because it ensures the value and wholeness of the data used in meta-synthesis research. To assess the quality of articles using qualitative methods, the Critical Appraisal Skills Program (CASP) was utilized. CASP consists of a total of 10 questions, of which two are related to the suitability of the aim and qualitative research method, and eight are related to the research design (sampling strategy, data collection, researcher's bias, ethical issues, data analysis, findings, and the value of research) (Sibeoni et al., 2017).

Determining the quality of included studies is important for ensuring the reliability of the conducted research synthesis. The quality score is calculated according to the criteria developed by Pluye et al. (2009) for methodical assessment of primary qualitative, quantitative, and mixed-methods studies conducted in health sciences, and it is based on the following formula: Quality score = number of met criteria/total number of criteria x 100. However, the quality score was calculated taking into account the CASP criteria which are more appropriate for the assessment of qualitative studies. Table 2 shows the criteria that the included studies met based on the coding carried out by two experts. For instance, according to the first expert's assessment, James's (2011) study met nine criteria. The quality score was calculated using the formula above as (9/10)*100 = 90. Generally, studies receiving a score of 70 % and above from at least one expert are considered to be of acceptable quality (Sibeoni et al., 2017).

The studies were appraised for quality by two independent experts, and the level of consistency between their evaluations was determined using the Krippendorff's alpha coefficient (Hayes & Krippendorff, 2007). This measure of consistency is applicable for all types of variables of any number of values involving two or more scorers. In this study, the consistency was calculated as $\alpha = 0.83$, and $\alpha > 0.80$ shows a high level of consistency (Hayes & Krippendorff, 2007). Table 2 presents the results of evaluation by the experts and the quality scores of the studies based on the CASP criteria.

Table 2
CASP summary according to the criteria

Author / Expert		The aim of the study is determined clearly	The use of suitable qualitative research methods	Rationale for the study design	Appropriate sampling strategy, description of the sample, and discussion about the sample	Appropriate description of data collection methods	Researchers critically examine their own roles in collecting and analysing data and their potential prejudices	Approval evidence by a relevant institution	Adequate and in-depth description of the anlysis process	Clear description of the findings, discussion of the evidence, reliability	Contribution to the existing knowledge and transferability	Quality Score
Motiwalla, 2007	Expt. 1	+	+	+	+	+	-	-	-	+	+	70
	Expt. 2	+	+	+	-	+	-	-	+	+	+	70
Abas, 2009	Expt. 1	+	+	-	+	+	+	-	-	+	+	70
	Expt. 2	+	+	-	+	+	+	-	-	+	+	70
Donaldson, 2011	Expt. 1	+	+	+	+	+	-	+	+	+	+	90
	Expt. 2	+	+	+	+	+	+	+	+	+	+	100

Author / Expert		The aim of the study is determined clearly	The use of suitable qualitative research methods	Rationale for the study design	Appropriate sampling strategy, description of the sample, and discussion about the sample	Appropriate description of data collection methods	Researchers critically examine their own roles in collecting and analysing data and their potential prejudices	Approval evidence by a relevant institution	Adequate and in-depth description of the anlysis process	Clear description of the findings, discussion of the evidence, reliability	Contribution to the existing knowledge and transferability	Quality Score
James, 2011	Expt. 1	+	+	+	+	+	+	-	+	+	+	90
	Expt. 2	+	+	+	+	+	+	-	+	+	+	90
Suki & Suki, 2011	Expt. 1	+	+	+	+	+	-	-	+	+	+	80
	Expt. 2	+	+	+	+	+	-	-	+	+	+	80
Abu-Al-Aish et al., 2012	Expt. 1	+	-	+	+	+	-	-	+	+	+	70
	Expt. 2	+	+	-	+	+	-	-	+	+	+	70
Davies, 2012	Expt. 1	+	-	+	+	+	+	+	+	+	+	90
	Expt. 2	+	-	+	+	+	+	+	+	+	+	90
Kim et al., 2013	Expt. 1	+	+	+	+	+	-	-	+	+	+	80
	Expt. 2	+	-	+	-	+	+	-	+	+	+	70
Nalliveettil & Alenazi, 2016	Expt. 1	+	-	+	+	+	-	+	+	+	+	80
	Expt. 2	+	-	+	+	+	+	-	+	+	+	80
Yılmaz, 2016	Expt. 1	+	+	+	+	+	-	-	+	+	+	80
	Expt. 2	+	+	-	+	+	+	-	+	-	+	70

The characteristics of studies used in the meta-synthesis (n = 10) are given in Table 3: the author's name, study method, data collection tools, sample size, the type of mobile device used in the study, data analysis, study type, the country where the study was conducted, and databases the studies were retrieved from.

Table 3
The characteristics of studies included in meta-synthesis

Author/ Year	*Method*	*Data collection tool*	*Sample size*	*Type of Mobile Device*	*Data analysis*	*Study Type*	*Country*	*Database*
Motiwalla, 2007 (R1)	Qualitative and quantitative Methods	Open-ended questions	44	Developed a prototype application	Content analysis	Article	USA	Elsevier
Abas et al., 2009 (R2)	Qualitative method	Focus groups of 7-11 people	51	SMS	Content analysis	Article	Malaysia	OUM (Open University Malaysia)
Donaldson, 2011 (R3)	Mixed method	Semi-structured interview	20	General	Content analysis	PhD Thesis	USA	FSU (Florida State University) LIBRARIES
James, 2011 (R4)	Qualitative Method	Semi-structured interview form Focus group	15	Device not mentioned	Thematic analysis	Article	Thailand	ERIC
Suki & Suki, 2011 (R5)	Case study	An open-ended questionnaire form	20	Mobile phone	Content analysis	Article	Malaysia	ERIC
Abu-Al-Aish et al., 2012 (R6)	Qualitative and quantitative Methods	Open-ended questions	25	M-learning (mobile phone, smart phone, PDA, tablet PC, Mp3) and internet utilization	Thematic analysis	Article	England	Research Gate

Table 3 *Continuing*

Author/Year	Method	Data collection tool	Sample size	Type of Mobile Device
Davies et al., 2012 (R7)	Mixed Method	4 focus group interviews 45 min interviews with groups of 3-7 persons	Between 12-28	Hewlett Packard iPAQ 114, SD memory card with a software package and classic portable PDA
Kim et al., 2013 (R8)	Qualitative and Quantitative Methods	Open-ended questionnaire form	53	Apple iPhones, Android phones, iPods, tablets, and other mobile devices; Laptops, MacBook, Netbooks, and other mobile computers
Nallliveettil & Alenazi, 2016 (R9)	Qualitative and Quantitative Methods	Open-ended questions	52	Smart phones
Yılmaz, 2016 (R10)	Qualitative Method	Open-ended questions	156	Mobile phone

Data analysis	Study Type	Country	Database
Content analysis	Article	UK	BMC Medical Education
Descriptive analysis	Article	Central US university	Scholar Space
Not mentioned	Article	Saudi Arabia	Academy Publication
Content analysis	Article	Turkey	ERIC

Step 4. Select and conduct meta-synthesis techniques to integrate and analyse qualitative research findings: A systematic method that comparatively analysed the included studies was employed in the study. This approach is a synthesis of techniques described by Campbell et al. (2003), Noblit and Hare (1988) and Tong et al. (2008) (acc. to Erwin et al., 2011). According to Erwin et al. (2011), researchers repeatedly read the articles to ensure that the first, second, and third-order data formats were used to analyse and reinterpret the findings obtained from the research reports. First-order data are direct quotes in primary studies, second-order ones are interpretative themes developed by the researchers, and third-order data are new and common themes derived from the synthesis of included studies.

Step 5. Present synthesis of findings across studies: The most important step of meta-synthesis research is the synthesis of qualitative data. In this context, first-order and second-order data of each study are presented. As shown in Table 3, studies included in the research were named R1, R2, and so on. Hence, participant assertions

obtained from the primary research were coded, for example, in the form of "R3:1, R3", referring to the first participant's assertion, and "R3:2, R3", referring to that of the second participant.

Results

Findings regarding the first research sub-question: What are the reasons for which university students prefer m-learning?

Based on the findings obtained from the meta-synthesis of studies examining university students' views after they experience m-learning, their reasons for preferring m-learning were classified as educational reasons, communicative reasons, making life easier, and belief. To determine the superiority of the statements, the frequency effect sizes were calculated by employing the following formula: number of reports containing the finding - number of duplicate reports/total number of studies investigating the finding (Sandelowski & Barroso, 2007, p. 160). In this method the frequency effect sizes are calculated by aggregating findings from qualitative studies that investigate similar research topics. Therefore, the purpose is to make further interpretation by determining the modernity and significance of the findings (Onwuegbuzie, 2003; Onwuegbuzie & Teddlie, 2003). Codes and frequency effect sizes given under educational reasons are presented in Table 4.

Educational reasons

Table 4
Codes and frequency effect sizes (%) under educational reasons

Educational reasons	Frequency Effect Size (%)
Learning independent of time and space	60 %
Enabling individual learning	40 %
Enabling the expansion of knowledge	40 %
Being able to utilize educational applications	30 %
Enabling repetition	10 %
Simplifying the content	10 %
Being suitable for simple contents	10 %

Learning independent of time and space is the code with the largest effect size within *educational advantages of m-learning*. While, relating to this code, the participant coded R6:1 in Abu-Al-Aish et al.'s (2012) study asserted, "*This would enable students to study whilst they are out, for example, on trains and buses etc., and would be enormously helpful,*" the participant coded R9:1 in Nallliveettil and Alenazi's (2016) study stated, "*Mobile phones are within our reach at any time, and we can use them without any time limit*". Considering the quotes derived from the authors of primary studies, Abas et al. (2009) have contended, "Mobile learning has the capacity to contribute to the flexibility of learning in ODL institutions. It can take learning right into the home, workplace and

community. It can be spontaneous and portable, unobtrusive and ubiquitous. Most of all, it can take educators in the ODL (open distance learning) environment one step nearer to achieving 'anytime, anywhere' learning" (p. 57). Motiwalla (2007) has asserted, "M-learning does extend the flexibility of learning from anytime/anyplace to anywhere" (p. 594). In a similar vein in the literature, Teodorescu (2015) studied m-learning experiences of university students and found that they consider the following as advantages of m-learning: being able to use interactive applications, diversity of resources, autonomy and flexibility for students, learning on the go, increasing students' confidence, and immediate feedback. In addition, in the first decade of the 21 century, the definition of m-learning has been refined in different forms and aspects. According to Baran (2014), the main focus of these definitions includes positive characteristics of m-learning such as mobility (Sharples et al., 2009), access (Parsons & Rye, 2006), and immediacy (Kynäslahti, 2003).

Other codes that yielded large effect sizes under the category of educational reasons of m-learning were *enabling individual learning* and *enabling the expansion of knowledge*. While participant R8:1 in Kim et al.'s (2013) study, with respect to the fact that m-learning enables individual learning, stated, "*It was a good tool for creating personalized learning,*" participant R4:1 in James's (2011) study declared, "*We all learn in different ways, and so the technology should help us do just this.*" Considering the quotes derived from the authors of the primary studies, Kim et al. (2013) have expressed, "In this study, students felt that they could create a personalized meaningful learning experience regardless of the mobile device they used for their learning activities" (p. 63). Concerning the fact that m-learning enables the expansion of knowledge, the participant coded R3:1 in Donaldson's (2011) study stated, "*I was looking on Wikipedia for something related to the US History class and the more information I read, the more I wanted to study different sites on various topics and I ended up, like, on something that served as an introduction into something I was learning later on.*" Donaldson (2011) has interpreted this point as follows, "Five students identified mobile device use as leading to intellectual exploration like reading beyond the required subject on Wikipedia or losing track of time while enjoying research" (p. 95). In their study, Agca and Özdemir (2013) investigated university students' use of mobile technology in foreign vocabulary learning and found that students not only looked up a foreign word but were also able to access other information about it. Regarding educational advantages, this statement may also correspond to the fact that m-learning enables the expansion of knowledge.

Another code, that was mostly indicated within educational reasons, was the ability to utilize educational applications. With respect to this code, a participant coded R3:2 in Donaldson's (2011) study stated, "*Between Homework and My Math application, that allows me to use math formulas, there's a whole lot of information, you know, in that. And it just so, like, organizes my thoughts*," while the participant coded R10:1 in Yılmaz's (2016) study said, "*We can download special educational applications such as simulations, animations, etc. and use it to support the theoretical course.*" Aish et al. (2012) have elaborated such situations as follows, "The popular mobile devices used

among students were smart phones with advanced computing and connectivity to the internet. The most popular learning activities using these devices were accessing the university timetable, U-link, using mobile applications to find tutorials for difficult mathematical questions (i.e. *Wolfram Calculus Course Assistant*), and downloading a scientific calculator" (p. 13).

Among other codes with lower frequency effect sizes under educational reasons are *enabling repetition*, *simplifying the content*, and *being suitable for simple contents*. Regarding the code *enabling repetition*, the participant coded R10:2 in Yılmaz's (2016) study said, "*We can watch videos that are recorded in the lessons*". Davies et al. (2012) have interpreted this situation as follows, "Students found that instant access provided by mobile technology allowed them to repeatedly look up information with ease, reinforcing their knowledge. They recognised that this was an important part of learning and appreciated the opportunity offered" (p. 4). Moreover, relating to the code *simplifying the content*, the participant coded R5:1 in Suki and Suki's (2011) study said, "*Yes, History of Art and Design Process is a difficult course to learn. I'd like to learn it using mobile learning approach.*" However, relating to the theme *being suitable to simple content*, the participant coded R5:2 said, "*Yes, it is fine for learning simple content.*"

Communicative reasons

Codes and frequency effect sizes under communicative reasons for preferring m-learning category are presented in Table 5.

Table 5
Codes and frequency effect sizes (%) relating to communicative reasons category

Communicative Reasons	Frequency Effect Size (%)
Effective communication opportunity	60 %
Establishing an online discussion platform	20 %

The code *effective communication opportunity* under communicative reasons for preferring m-learning has the largest effect size. The participant coded R3:3 in Donaldson's (2011) study said, "*It certainly allows me to communicate better because before I got the mobile phone, I could go two or three days without realizing that I got an email from my instructor. Now I pull it out more often.*" While Aish et al. (2013) interpreted this point with the words, "It will improve the communication between students and their lecturers," Kim et al. (2013) added, "The majority of participants reported that discussion boards have many benefits (e.g., creating and sharing messages) as an online collaboration tool for mobile learning activities." However, regarding the code *establishing an online discussion platform*, the participant coded R8:2 in Kim et al.'s (2013) study said, "*I feel it was a useful tool (Online discussion board) for communication...*" Investigating university students' preference priorities in using mobile services, Trifonova and Georgieva (2006) found that 65 % of students communicate with their teachers, while 53.7 % communicate with other students.

Making life easier

The codes and frequency effect sizes for *m-learning makes life easier* are presented in Table 6

Table 6
Codes and frequency effect sizes (%) under making life easier

Making life easier	Frequency Effect Size (%)
Being handy	50 %
Saving time	40 %
Being facile	40 %
Planning	30 %
Being suitable to our era	20 %

The code *being handy* has the highest effect size in *m-learning makes life easier* category. The participant coded R7:1 mentioned this code in Davies et al.'s (2012) study, "*When you see the patient and can access the information at the same time.*" In the same study, this situation was elaborated as follows, "Initial perceptions of the advantages to using a PDA in medical education were benefits of instant access and portability of the device" (p. 3). The code *saving time* was expressed by the participant coded R5:3 in Suki and Suki's (2011) study, "*I like the idea. It helps me a lot whenever the lecturer is away from the campus. It saves me in terms of time factors.*" Aish et al. (2012) have accounted for this situation as "M-learning can save students' time." However, the code *being facil*e was mentioned by the participant coded R9:2, "*If you need to search for a word from a book (hard copy), sometimes you need to turn many pages, but in the mobile phone, it is easy to search and find a word*" in Nallliveettil and Alenazi's (2016) study. Suki and Suki (2011) have shed light onto this point in their study, "There were six students who liked the idea of mobile technology improving their knowledge. This is due to the size and convenience factors of the mobile device that they could easily carry with them and access on the go" (p. 49).

Other codes under *making life easier* category are "planning" and "being suitable to our era". The code *planning* was mentioned by the participant coded R3:4 in Donaldson's (2011) study, "*It helps me manage my time and be productive.*" Abas et al. (2009) explained this situation, "The majority of the learners were enthusiastic about SMS that conveyed information on course management – like scheduling and timetabling" (p. 55). The code *being suitable to our era* was stated by the participant coded R9:3 in Nallliveettil and Alenazi's (2016) study, "*In this century, we can't imagine our lives without a mobile.*" Donaldson (2011) interpreted this situation, "One speculated that growing up in the digital age may have made using mobile devices easier for him" (p. 90). The balance between access to education and family life reported as a result of a systematic analysis of studies investigating university students' online course experiences by Blackmon and Major (2012) match the *planning* and *saving time* codes of *making life easier* category in this study. Jacob and Issac (2008) found that 66 % of university students state that

m-learning should be supported in this digital age. Besides, in their study with university students, Corlett et al. (2015) concluded that students use the calendar and schedule features of mobile applications besides using their communicative features. This, in turn, highlights the *planning* dimension of m-learning in our study.

Belief

Codes and frequency effect sizes of the *belief* category for preferring m-learning are given in Table 7.

Table 7
Codes and frequency effect sizes (%) relating to the belief category

Belief	Frequency Effect Size (%)
Positive attitude	40 %
Believing that it provides motivation	30 %

The code *positive attitude* has the highest frequency effect size under the category *belief*. This code was mentioned by the participant coded R2:1 in Abas et al.'s (2009) study, "*We felt like we were so special*," and in Aish et al.'s (2012) study, "The findings of the study show that students have a positive perspective of using M-learning and they look at it as a support system for traditional class based learning" (p. 1). Moreover, while the participant coded R2:2 in Abas et al.'s (2009) study mentioned the code *it provides motivation* as, "*I think this [sic] kind of words really motivate,*" Donaldson (2011) has interpreted this situation in his study, "Comments from participants also suggest that the convenience of accessing information on a mobile device contributes to their enjoyment" (p. 113). Using mobile devices for content retrieval creates learning opportunities and increases student motivation (Ally et al., 2007; Mendez-Coca & Silisko, 2013).

Findings on the second research sub-question: What are the reasons why university students do not prefer m-learning?

Based on the findings obtained from the meta-synthesis of studies examining university students' views after they experience m-learning, students' reason for not preferring m-learning were classified under the categories of technical problems, economic problems, ergonomic problems, belief, and reliance on face-to-face education. Codes and frequency effect sizes under technical problems are presented in Table 8

Technical problems

The codes with the highest frequency effect sizes under *technical problems* are file-related problems, slow connection speed and signal, and application-related problems. The code *file-related problems* was expressed by the participant coded R3:5 in Donaldson's (2011) study, "*My phone can't open and edit files. Same with downloading and viewing PPT. I can download small word or PPT files, but not large ones. It is a hassle because it*

Table 8
Codes and frequency effect sizes (%) relating to the technical problems category

Technical problems	Frequency Effect Size (%)
File-related problems	30 %
Slow connection speed and signal	30 %
Application-related problems	30 %
Security of the personal data	20 %
Unsuitability of devices for m-learning	20 %
Operating system problems	10 %
Poor resolution	10 %

takes so long." Donaldson (2011) clarified this situation in his study, "Participants of this study also mentioned the inability to watch videos or access certain websites due to the lack of support, i.e. *JavaScript* or *Flash*" (p. 86). While the code *low connection speed and signal* was phrased, "*The disadvantages were slower Internet connectivity...*" by the participant coded R8:3 in Kim et al.'s (2013) study, another participant in James's (2011) study, coded R4:2, stated, "*...even when we are in town, the signal sometimes isn't all that good.*" Donaldson (2011) explained this point, "Interview subjects identified physical aspects of mobile technologies such as small screen size, poor resolution, battery life, the ability to view and edit files, processing speed, long download time, and diverse operating systems as potential barriers to the acceptance of mobile learning." (p. 119). Alrasheedi et al. (2015) conducted a systematic review of existing studies to discover factors that affected students' achievement in m-learning and found that around 38.65 % of 1565 people had Internet access, showing similarity with the results of the present study. Moreover, Corlett et al. (2015) stated that the participants in their study were concerned that documents in the mobile applications would not be easily transferred to other software and devices after the course. This point shows similarity to *file-related problems* as reasons for not preferring m-learning.

The code *application-related problems* was expressed by the participant coded R4:3 in James's (2011) study, "*I bought this phone for me, not for university materials – it takes up a lot of memory and leaves little for my photos and videos.*" Abas et al. (2009) explained this point, "The lack of guidelines or instructions on what learners were to do led to some feelings of frustration" (p. 54). Further, the code *security of personal data* was expressed by the participant coded R9:4 in Nallliveettil and Alenazi's (2016) study, "*Care should be taken of the security of the device and personal data.*"

The code *unsuitability of devices for m-learning* was noted by the participant coded R5:4 in Suki and Suki's (2011) study, "*My phone does not have the advanced features of a smart phone.*" In the same study, this point was interpreted, "They also faced navigation problems due to feature restrictions of the device" (p. 50). Considering the code *operating system problems*, the participant coded R3:6 in Donaldson's (2011) study asserted, "*Getting the Android phone onto the Blackboard system is a nightmare...*" Besides, Kim et al. (2013) explicated, "Students faced an unexpected practical issue

with Voice Thread (at the time of the study there was an app for Apple iPhones, but not for Android phones). When faced with this obstacle, Android users switched to portable computers to complete their projects. It appears that many of these technologies, though well designed for entertainment purposes, became less user-friendly when applied to pedagogical activities" (p. 63).

Furthermore, the code *low resolution* was mentioned by the participant coded R5:5 in Suki and Suki's (2011) study, "*Screen resolution restricts my learning experience*". They (2011) interpreted this point as follows, "Furthermore, the viewing and learning experience is not clear enough due to poor screen resolution."

Economic problems

Codes and frequency effect sizes under the category *economic problems* are presented in Table 9.

Table 9
Codes and frequency effect sizes (%) relating to economic problems category

Economic problems	Frequency Effect Size (%)
Costliness of mobile devices	30 %
High internet prices	10 %
Lack of adequate participation	10 %

Of codes under economic problems, *costliness of mobile devices* had the highest frequency effect size. This code was stated by the participant coded R4:4 in James's (2011) study, "*You have to be rich to have the kind of tool that's always connected. I mean… uh… like it needs a huge monthly cost... I can't afford that now.*" Yılmaz (2016) has explained this point, "As is known, all technological devices should be replaced with a new one some time. This replacement is a financial burden for schools" (p. 183). While concerning the code *high internet prices*, the participant coded R6:2 in Aish et al.'s (2012) study stated, "*Internet charges are high if it is used a lot,*" another participant coded R6:3 stated, "*Not enough people will be using it,*" concerning the *lack of adequate participation* code. As such, many studies confirm problems regarding the costliness of mobile devices (Börner et al., 2010; Naismith & Corlett, 2006; Trifonova & Georgieva, 2006).

Ergonomic problems

Codes and frequency effect sizes under the category of *ergonomic problems* are presented in Table 10.

Table 10
Codes and frequency effect sizes (%) under ergonomic problems

Ergonomic problems	Frequency Effect Size (%)
Small screen size	30 %
Small keypad	20 %
Device handling problems	10 %

Of codes under the category of ergonomic problems, *small screen size* had the highest frequency effect size. This code was stated by the participant coded R8:4 in Kim et al.'s (2013) study as, "*It was uncomfortable to read the opinions of others on smaller devices.*" Clarifying this point, Donaldson (2011) stated, "...small screen size is a barrier for using mobile devices for learning. More specifically, small screen size hinders one's ability to both read text and enter information" (p. 86). Another code with a high frequency effect size was *small keypad* that was mentioned by the participant coded R8:5 in Kim et al.'s (2013) study, "*The disadvantages were slower Internet connectivity and smaller keypad*" (p. 59). These points are interpreted in Motiwalla's (2007) study as follows, "Most students in our sample found the mobile phone keypad and screens very difficult to navigate, read and type their messages." Ally et al. (2007) argue that small screen sizes may make it difficult to focus on learning because of continuous navigation between the pages, but these limitations will be obviated with the continuous advancement of mobile technologies. Limited screen size and restricted interaction are considered as disadvantages of a mobile device when compared to desktop computers. An experimental study by Hürst et al. (2007) revealed that, regardless of restrictions, mobile media players have the potential to promote learning. Jacob and Issac (2008) found that 54 % of students in their study stated that mobile devices should have larger screen sizes.

Further, the code *device handling problems* was mentioned by the participant coded R7:2 in Davies et al.'s (2012) study as follows, "*The only thing is that you don't have that many pockets - certainly I don't. Therefore, I would have my wallet in one pocket and my phone in another, because you can't keep your phone at home - and I found it quite hard to carry it around with me all the time.*"

Belief

Codes and frequency effect sizes under the category *belief* are presented in Table 11.

Table 11
Codes and frequency effect sizes (%) relating to belief category

Belief	Frequency Effect Size (%)
Negative attitude towards mobile devices	40 %
Believing that it is not suitable for learning	40 %
Believing that it is a waste of time	30 %
Educator's resistance to technology	20 %
Misunderstanding the use of mobile technology	20 %
Believing that there is a reluctance towards producing mobile content	10 %

Of codes under belief, *negative attitude towards mobile devices* and *believing that they are not suitable for learning* have the highest frequency effect sizes. Negative attitude towards mobile devices was expressed by the participant coded R9:5 in Nallliveettil and Alenazi's (2016) study, "*I think using a mobile phone in the classroom is very bad.*"

Clarifying this point, Suki and Suki (2011) reported, "Many of the students were reluctant to accept mobile technology usage for learning because they were unfamiliar with this new idea of learning. They used to learn using a studio-based approach, and thus they were not open to this new learning concept" (p. 48). The code *believing that it is not suitable for learning* was expressed by the participant coded R9:6 in Nallliveettil and Alenazi's (2016) study, "*Smartphones are good for communication, but not for learning. Not all people use smartphones to learn.*" Moreover, relating to the code *believing that it is a waste of time*, the participant coded R6:4 in Aish et al.'s (2012) study stated, "*It may be seen more as a waste of time than saving people's time*" (p. 11). While with respect to the code *educators' resistance to technology*, another participant coded R6:5 stated, "*Tutors are the ones reluctant to change. For example, those that do the same lectures year in, year out with no change, and those who still use overhead projectors rather than adapting to more efficient technologies.*" Davies et al. (2012) have interpreted educators' resistance to technology as follows, "If teachers were enthusiastic and advocated their use on ward rounds and in clinics, then students would more likely make it a part of their routine" (p. 7). The code *believing that m-learning is a waste of time* that emerged in this category, and the code *saving time* under *making life easier* category, which is the advantage of m-learning, indicate obvious indecisiveness in the literature.

The code *misunderstanding the use of mobile technology* was stated by the participant coded R7:3 in Davies et al.'s (2012) study as, "*I think some doctors have made comments about what we were doing on that, texting someone, or playing games.*" Suki and Suki (2011) have interpreted this point as, "They lost concentration during m-learning activities and ended up chatting and browsing infotainment and entertainment content instead of learning" (p. 49). Furthermore, the code *believing that there is a reluctance towards producing mobile content* was mentioned by the participant coded R6:5 in Aish et al.'s (2012) study, "*I do not believe lecturers will want to take the time to effectively make two sets of lecture notes and make them as presentable and clear as a mobile application would need them to be.*" Yang and Cornelius (2004) investigated the perceptions of university students regarding the quality of an online education they had received and revealed that one of the emerging themes was poorly designed online course content. This supports the emerging theme in our study concerning the belief that there is reluctance towards producing mobile content. Naismith and Corlett (2006) identified five critical success factors for mobile devices. Among them, the concept of integration, in particular, is related to the adaptation of mobile technologies to the teaching-learning environment. Besides, the concept of institutional support refers to designing related resources in mobile format, training personnel, and providing technical support. Considering these success factors, the educators' resistance to m-learning may be due to the lack of institutional support. In addition, with the use of the meta-synthesis method, Akay (2020) examined the findings of qualitative studies on in-service teachers' views, resistance, and suggestions regarding technology, where he found that insufficient time, lack of access to computer-software, inadequate technical and administrative support, teacher's beliefs and attitudes, and difficulty of adapting

technology to instructional design are the causes of teachers' resistance. With regard to these causes, inadequate technical and administrative support and teachers' beliefs and attitudes showed congruence with the results of this study.

Reliance on face-to-face education

Codes and frequency effect sizes under the category reliance on face-to-face education are given in Table 12.

Table 12
Codes and frequency effect sizes (%) relating to reliance on face-to-face education category

Reliance on face-to-face education	Frequency Effect Size (%)
M-learning cannot replace face-to face lessons	40 %
Preferring face-to-face interaction	20 %
Lack of collaboration	10 %
Unsuitable for complex topics	10 %

Of codes under category of reliance on face-to-face education, the code *m-learning cannot replace lessons* has the highest frequency effect size. Besides, no second-order data are available from the authors of primary studies regarding the codes under this theme. The code *m-learning cannot replace face-to-face lessons* was mentioned by the participant coded R9:7 in Nallliveettil and Alenazi's (2016) study, "*Smartphones are helpful, but as a student you always need real books to learn.*" Further, the code *preferring face-to-face interaction* was expressed by the participant coded R4:5 in James's (2011) study, "*Why we need to do this...I don't know...I prefer listening to my lecturer directly.*" Likewise, the code *lack of collaboration* was mentioned by the participant coded R8:6 in Kim et al.'s (2013) study, "*One of the disadvantages is that collaboration may not be very effective.*" Lastly, the code *unsuitable for complex topics* was expressed by a participant coded R5:6 in Suki and Suki's (2011) study, "*I doubt that mobile device could enhance my knowledge on a difficult subject.*" Among the advantages of m-learning, expressions *being suitable for simple contents* under educational advantages category and *unsuitable for complex contents* that emerged in this theme seem to support each other. Börner et al. (2012) examined the problems faced in m-learning by experts in the field of m-learning and concluded that there are problems of regulating learning, collaboration, and social interaction. Although various studies value the significance of mobile technologies and the slogans of "learning anytime and anywhere" with respect to m-learning, traditional education is also thought to be threatened (Pedro et al., 2018). Though students like to practice based on their own preferences, they maintained that m-learning is not a learning method on its own, but an additional tool in their formal education (Teodorescu, 2015).

Conclusion

Step 6. Reflection on the process: As a result of the qualitative data synthesis in step six, university students' reasons for preferring and not preferring m-learning were

discussed separately. In addition, this discussion process is the third-order dimension derived from the synthesis of studies.

This meta-synthesis study, which investigated m-learning experiences of university students, examined students' reasons in the context of why they do and do not prefer m-learning after experiencing it. In accord with the findings obtained through the meta-synthesis process, the reasons university students preferred mobile technologies in education were classified as: educational reasons, reasons regarding communication, making life easier, and belief. Within the category of educational reasons, 'learning independent of time and space' comes to the fore as the most emphasized reason for the preference. M-learning offers equal learning opportunities for all students by providing a learning experience that is independent of time and space constraints (Ally & Prieto-Blázquez, 2014). In educational activities carried out worldwide during the pandemic we are experiencing, it seems that the strongest advantage of m-learning over face-to-face learning is that it enables learning independent of time and space. After the code 'learning independent of time and space', enabling individual learning and the expansion of knowledge were among the most highlighted reasons for the preference. M-learning gives students access to mass databases by means of its online and offline services and offers a customized learning experience to the learner with this possibility. In m-learning, students are seen as individuals who constantly change their interest and needs, seek knowledge based on intrinsic needs, and regulate their own learning (Yokuş, 2019). Being able to utilize educational applications, enabling repetition, simplifying the content, and being suitable for simple contents were other reasons for this preference among educational reasons. Besides, communicative reasons category included effective communication opportunities and establishing an online discussion platform. Mobile devices allow students to learn by sharing their knowledge and expertise, completing a task, or interacting with other students while working collaboratively on a project (Ally & Prieto-Blázquez, 2014). In this way, organized activities can be carried out through social network technologies and online communities. This, in turn, enables students to actively participate in the learning process when they interact to exchange and to create meaningful information congenial to social constructivism (Vygotsky, 1978). In making life easier category, being handy, saving time, being facilitative, planning, and being suitable to our era were reasons for this preference. Moreover, positive attitudes and motivation are given under belief category with a similar level of emphasis. Mobile technology not only brings information and educational resources to our fingertips but also makes learning more interactive, rich and fun (Eschenbrenner & Nah, 2007).

The reasons why university students do not prefer mobile technologies in education were classified under categories of technical problems, economic problems, ergonomic problems, belief, and reliance on formal education. In technical problems category, file-related problems, low connection speed and signal, and applications-related problems were the most highlighted reasons for m-learning not being preferred. Technical limitations are not directly related to m-learning, but to limitations of the

used mobile devices (Bozkurt, 2015). It could be argued that limitations caused by technical reasons may largely disappear with the ongoing advancements in technology. According to the data from 2018, Alphabet, Microsoft, Samsung Electronics, Apple Inc., and Intel Corporation are among the top 10 companies according to expenditure on innovation. The total innovation investment of the five companies was $68.5 billion USD (https://www.strategyand.pwc.com/gx/en/insights/innovation1000.html#/tab2015|GlobalKeyFindingsTabs4, 2020). From this perspective, the current and possible future limitations caused by technical problems of m-learning applications may cease to exist with investments in technology. The codes security of personal data, unsuitability of the devices for m-learning, problems with operating systems, and low resolution are other codes under the category of technical problems. Presently, there are user concerns about the security of personal information related to *Cloud* information technology, which allows fast, flexible, and low-cost storage of data and enables sharing without time and space constraints. Şengül and Bostan (2019) stated that there are security problems related to *Cloud* computing, such as not knowing and failing to control the competence of the cloud service providers, not knowing where services and/or data are located, and service providers not taking responsibility for security, data integrity, and access control issues. Another theme among the reasons for not preferring mobile technologies is economic problems. In economic problems category, costliness of mobile devices is the most emphasized reason for which university students do not prefer m-learning. In addition to the costliness of mobile technologies, high internet prices and lack of adequate participation are cited as economic problems, therefore also being the reasons for the non-preference. The International Telecommunication Union has manifested that the main obstacle to Internet use in underdeveloped countries is the expense and lack of digital skills in users (https://www.itu.int/en/mediacentre/Pages/2019-PR19.aspx, 2020). However, there are also efforts to reduce economic barriers to m-learning opportunities. Millions of computers have been distributed to students as a result of adopting *One Laptop per Child* (OLPC) notion in around 50 developed and developing countries, without expecting profit. These projects, starting with pilot studies in 2007, aimed to eliminate numerical inequality and increase the quality of education with computers purchased at affordable prices (Doğan et al., 2016). Similar projects can also be implemented for university students. Ergonomic problems category included small screen size, small keypad, and device handling problems. Likewise, under the category of belief, the negative attitude towards mobile devices, believing that it is not suitable for learning and that it is a waste of time are the most emphasized reasons for the non-preference. Reasons behind university students not seeing mobile technologies as learning tools and considering them a waste of time may be that these technologies are mainly developed as communication, network, photography, navigation, and entertainment tools. The fact that university students consider m-learning a waste of time can be attributed to the concepts of academic cyberloafing (Knight, 2017) and cognitive absorption (Agarwal & Karahanna, 2000). Educators' resistance to technology, misunderstanding the use of mobile technology, and reluctance towards producing mobile content in the belief category are other

reasons for not preferring m-learning. Falowo (2007) noted that barriers to web-based distance education applications may stem from students, institutions, and faculty members. In the category of reliance on face-to-face education, m-learning cannot replace lessons, preferring face-to-face interaction, not allowing collaboration, and being unsuitable for complex topics are reasons for the non-preference.

This meta-synthesis study, which examined university students' m-learning experiences, identified categories and codes that show similarities and differences between the reasons for students' preference and non-preference of m-learning. For example, the reasons for preferring m-learning include having a positive attitude towards mobile technology, believing that it provides motivation, believing that it provides effective communication, and saving time. On the other hand, the reasons for not preferring m-learning include having a negative attitude towards mobile technology, believing it is not suitable for learning, that it lacks collaboration, and that it is a waste of time. Apparently, there are different opinions, i.e. reasons why university students do and do not prefer the use of mobile technologies in education. There is a similarity between the reasons for which university students prefer or not prefer m-learning experiences: the reasons for preferring m-learning include its suitability for simple content, while the reason for not preferring it is its inappropriateness for complex topics. Moreover, there are also views that show similarity between the reasons for which university students do and do not prefer mobile technologies in education.

Recommendations

It is obviously not difficult to predict that technology products will take on a greater role in education over time. Especially during the pandemic we are experiencing, we see that the way we access education has changed and that mobile technologies present the platform for using distance education applications. Although m-learning applications were considered arbitrary before the pandemic, they are viewed as an essential need now. From this perspective, this meta-synthesis study, which aimed to identify the rationale behind university students preferring m-learning or not after experiencing it, may contribute to improving the quality of m-learning applications today and in the future. In this context, recommendations were developed for the implementation and researchers.

Recommendations for implementation

1) Governments could issue laws for securing personal data of the users of mobile technologies in education.
2) Instructional designs could be developed for the m-learning process.
3) Professional development programs could be organized based on TPACK (Technological Pedagogical Content Knowledge) to promote the educators' technology utilization competence in education.
4) Financial support could be provided to students by governments and international organizations to enable students to access mobile technologies.

Recommendations for researchers

1) Students attitudes towards m-learning could be investigated in the wake of m-learning experience that is free from technical, technological, and economic constraints.
2) Researchers could perform meta-summary studies concerning m-learning in the future.
3) A case study that offers a holistic view of the justification for the use of mobile technologies in teaching could be conducted.

References

(*) marked studies were included in the meta-synthesis.

*Abas, Z. W., Lim, T. S., & Woo, T. (2009). Mobile learning initiative through SMS: A formative evaluation. *ASEAN Journal of Open and Distance Learning*, *1*(1), 49-58.

*Abu-Al-Aish, A., Love, S., & Hunaiti, Z. (2012). Mathematics students' readiness for mobile learning. *International Journal of Mobile and Blended Learning (IJMBL)*, *4*(4), 1-20. https://doi.org/10.4018/jmbl.2012100101

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, *24*(4), 665-694. https://doi.org/10.2307/3250951

Agca, R.K., & Özdemir, R. (2013). Foreign language vocabulary learning with mobile technologies. *Procedia Social and Behavioral Sciences*, 83, 781-785. https://doi.org/10.1016/j.sbspro.2013.06.147

Akay, C. (2020). In-service teachers' resistance to technology: A qualitative meta-synthesis by ENTREQ statement (1998-2018). *International Journal of Education Technology and Scientific Researches*, *5*(12), 924-944. https://doi.org/10.35826/ijetsar.154

Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior*, 56, 93-102. https://doi.org/10.1016/j.chb.2015.11.033

Ally, M., McGreal, R., Schafer, S., Tin, T., & Cheung, B. (2007, October). *Use of mobile learning technology to train ESL adults*. Proceedings of the Sixth International Conference on Mobile Learning, Melbourne.

Ally, M., & Prieto-Blázquez, J. (2014). What is the future of mobile learning in education? Mobile learning applications in higher education [Special Section]. *Revista de Universidad y Sociedad del Conocimiento (RUSC)*, *11*(1), 142-151. http://dx.doi.org/10.7238/rusc.v11i1.2033

Alrasheedi, M., Capretz, L.F., & Raza, A. (2015). A systematic review of the critical factors for success of mobile learning in higher education (university students' perspective). *Journal of Educational Computing Research*, *52*(2), 257-276. https://doi.org/10.1177/0735633115571928

Baran, E. (2014). A review of research on mobile learning in teacher education. *Educational Technology & Society*, *17*(4), 17-32.

Blackmon, S., & Major, C. (2012). Student experiences in online courses: A qualitative research synthesis. *The Quarterly Review of Distance Education*, *13*(2), 77-85.

Bondas, T., & Hall, O. C. E. (2007). Challenges in approaching metasynthesis research. *Qualitative Health Research*, *17*(1), 113-121. https://doi.org/10.1177/1049732306295879

Bozkurt, A. (2015). Mobil öğrenme: her zaman, her yerde kesintisiz öğrenme deneyimi [Mobile learning: Continuous learning anytime, anywhere]. *Açıköğretim Uygulamaları ve Araştırmaları Dergisi*, *1*(2), 65-81.

Börner, D., Glahn, C., Stoyanov, S., Kalz, M., & Specht, M. (2010). Expert concept mapping study on mobile learning. *Campus-Wide Information Systems*, *27*(4), 240-253. http://dx.doi.org/10.1108/10650741011073789

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

Corlett, D., Sharples, M., Bull, S., & Chan, T. (2015). Evaluation of a mobile learning organizer for university students. *Journal of Computer Assisted learning*, 21, 162-170. https://doi.org/10.1111/j.1365-2729.2005.00124.x

*Davies, B. S., Rafique, J., Vincent, T. R., Fairclough, J., Packer, M. H., Vincent, R., & Haq, I. (2012). Mobile Medical Education (MoMEd) - how mobile information resources contribute to learning for undergraduate clinical students - a mixed methods study. *BMC Medical Education*, *12*(1), 1-11. https://doi.org/10.1186/1472-6920-12-1

*Donaldson, R.L. (2011). *Student acceptance of mobile learning* (PhD Dissertation). Florida State University Libraries. https://diginole.lib.fsu.edu/islandora/object/fsu:168891/datastream/PDF/

Doğan, D., Çınar, M., & Seferoğlu, S. S. (2016). "One Laptop per Child" projects and FATIH project: A comparative examination. *SDU International Journal of Educational Studies*, *3*(1), 1-26.

El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. *Educational, Technology & Society*, *13*(3), 12–21.

Erwin, J. E., Brotherson, J. M., & Summers, A. J. (2011) Understanding qualitative metasynthesis: Issues and opportunities in early childhood intervention research. *Journal of Early Intervention*, *33*(3), 186-200. https://doi.org/10.1177/1053815111425493

Eschenbrenner, B., & Nah, F.F-H. (2007). Mobile technology in education: Uses and benefits. *International Journal of Mobile Learning and Organisation (IJMLO)*, *1*(2), 159–183. https://doi.org/10.1504/ijmlo.2007.012676

Falowo, R. O. (2007). Factors impeding implementation of web-based distance learning. *AACE Journal, 15*(3), 315-338.

Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures, 1*, 77-89. https://doi.org/10.1080/19312450709336664

Herrington, A., & Herrington, J. (2007). Authentic mobile learning in higher education. In: AARE 2007 International Educational Research Conference. 28 November 2007. Fremantle, Western Australia. http://researchrepository.murdoch.edu.au/5413

Hürst, W., Lauer, T., & Nold, E. (2007). A study of algorithm animations on mobile devices. *ACM SIGCSE Bulletin*, *39*(1), 160-164. https://doi.org/10.1145/1227504.1227368

Jacob, S.M., & Issac B. (2008, 19-21 March). *The mobile devices and its mobile learning usage analysis*. Proceedings of the International Multi Conference of Engineers and Computer Scientists, Hong Kong.

*James, P.T.J. (2011). Mobile-learning: Thai HE student perceptions and potential technological impacts. *International Education Studies*, *4*(2), 182-194. https://doi.org/ 10.5539/ies.v4n2p182

Kaliisa, R., Palmer, E., & Miller, J. (2019). Mobile learning in higher education: A comparative analysis of developed and developing country contexts. *British Journal of Educational Technology*, *50*(2), 546-561. https://doi.org/10.1111/bjet.12583

*Kim, D., Rueckert, D., Kim, D.J., & Seo, D. (2013). Students' perceptions and experiences of mobile learning. *Language Learning & Technology*, *17*(3), 52-73.

Knight, R. M. (2017). Academic cyberloafing: A study of perceptual and behavioral differences on in-class cyberloafing among undergraduate students. (Master's Thesis). East Carolina University, ABD.

Kynäslahti, H. (2003). In search of elements of mobility in the context of education. In H. Kynäslahti & P. Seppälä (Eds.), *Mobile learning* (pp. 41–48). IT Press.

McConatha, D., Praul, M., & Lynch, M. (2008). Mobile learning in higher education: An empirical assessment of a new educational tool. *Turkish Online Journal of Educational Technology*, 7, 15-21.

Mendez-Coca, D., & Slisko, J. (2013). Software *Socrative* and smartphones as tools for implementation of basic processes of active physics learning in classroom: An initial feasibility study with prospective teachers. *European Journal of Physics Education*, *4*(2), 17-24.

*Motiwalla, L.F. (2007). Mobile learning: A framework and evaluation. *Computers & Education*, *49*(3), 581-596. https://doi.org/10.1016/j.compedu.2005.10.011

*Nalliveettil, G.M., & Alenazi, T.H.K. (2016). The impact of mobile phones on English language learning: Perceptions of EFL undergraduates. *Journal of Language Teaching and Research*, *7*(2), 264-272. http://dx.doi.org/10.17507/jltr.0702.04

Nassuora, A.B. (2013). Students' acceptance of mobile learning for higher education in Saudi Arabia. *International Journal of Learning Management Systems*, *1*(1), 1-9. https://doi.org/10.12785/ijlms/010101

Onwuegbuzie, A. J. (2003). Effect sizes in qualitative research: A prolegomenon. *Quality & Quantity*: *International Journal of Methodology, 37*(4), 393–409. https://doi.org/10.1023/A:1027379223537

Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 351–383). Sage.

Park, S. Y., Nam, M. W., & Cha, S. B.(2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. *British Journal of Educational Technology*, *43*(4), 592-605. https://doi.org/10.1111/j.1467-8535.2011.01229.x

Parsons, D., & Ryu, H. (2006). A framework for assessing the quality of mobile learning [Paper presentation]. In R. Dawson, E. Georgiadou, P. Lincar, M. Ross, & G. Staples (Eds.). *Learning and teaching issues in software quality.* 11th International Conference for Process Improvement, Research and Education (pp. 17–27). Southampton, UK.

Pedro, L. F. M. G., Barbosa, C. M. M. D., & Santos, C. M. D. (2018). A critical review of mobile learning integration in formal educational contexts. *International Journal of Educational Technology in Higher Education*, *15*(10), 1-15. https://doi.org/10.1186/s41239-018-0091-4

Pluye, P., Gagnon, M.P., Griffith, F., & Johnson-Lafleur, J. (2009). A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in mixed studies reviews. *International Journal of Nursing Studies*, 46, 529-546. https://doi.org/10.1016/j.ijnurstu.2009.01.009

Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer.

Sarrab, M., Elgamel, L., & Aldabbas, H. (2012). Mobile learning (m-learning) and educational environments. *International Journal of Distributed and Parallel Systems (IJDPS)*, *3*(4), 31-38. https://doi.org/10.5121/ijdps.2012.3404

Sharples, M., Arnedillo-Sánchez, I., Milrad, M., & Vavoula, G. (2009). Mobile learning: Small devices, big issues. In S. Ludvigsen, N. Balacheff, T. D. Jong, A. Lazonder, & S. Barnes (Eds.), *Technology-enhanced learning: Principles and products* (pp. 233–249). Springer. https://doi.org/10.1007/978-1-4020-9827-7_14

Sibeoni, J., Orri, M., Valentin, M., Podlipski, M.A., Colin, S., Pradere, J., & Revah-Levy, A. (2017). Metasynthesis of the views about treatment of anorexia nervosa in adolescents: Perspectives of adolescents, parents, and professionals. *PLoS ONE*, *12*(1), 1-21. https://doi.org/10.1371/journal.pone.0169493

*Suki, N. M., & Suki, N. M. (2011). Using mobile device for learning: From students' perspective. *US-China Education Review A*, 1, 44-53.

Şengül, G., & Bostan, A. (2013). *Bulut bilişimde bilgi güvenliği ve standardizasyon çalışmaları [Information security and standardization studies in cloud computing]*. VI. Uluslararası Bilgi Güvenliği ve Kriptoloji Konferansında sunulan bildiri, Ankara, Türkiye. Erişim adresi: https://www.iscturkey.org/assets/files/2016/03/2013-paper45.pdf

Teodorescu, A. (2015). Mobile learning and its impact on business English learning. *Procedia Social and Behavioral Sciences*, 180, 1535-1540. https://doi.org/10.1016/j.sbspro.2015.02.303

Tong A., Flemming K., McInnes E., Oliver S., & Craig J. (2012). Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. *BMC Medical Research Methodology*, 12:181. https://doi.org/10.1186/1471-2288-12-181

Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having writ....*The International Review of Research in Open and Distributed Learning*, *8*(2), https://doi.org/10.19173/irrodl.v8i2.346

Trifonova, A., & Georgieva, E. (2006, 20-22 November). Determining students' readiness for mobile learning [Paper presentation]. *Proceedings of the 5th WSEAS International Conference on E-ACTIVITIES*, Italy, Venice, (pp. 84-89).

Vygotsky, L. (1978). Mind and society: The development of higher mental processes. Harvard University Press.

Yang, Y., & Cornelius, L.F. (2004). Students' perceptions towards the quality of online education: A qualitative approach. *Association for Educational Communications and Technology*, 27, 861-877.

Yang, S., Zhou, S., & Cheng, X. (2019). Why do college students continue to use mobile learning? Learning involvement and self-determination theory. *British Journal of Educational Technology*, *50*(2), 626-637. https://doi.org/10.1111/bjet.12634

*Yılmaz, O. (2016). E-learning: Students input for using mobile devices in science instructional settings. *Journal of Education and Learning*, *5*(3), 182-192. https://doi.org/10.5539/jel.v5n3p182

Yokuş, G. (2019). Öğretim *Teknolojileri [Instructional Technologies]*. Mobil Öğrenme [Mobile Learning]. T. Y. Yelken (Ed.), (pp. 99-118). Anı Publishing.

Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: A literature review. *Journal of Advanced Nursing*, *50*(2), 204-211.

Wang, Y.S., Wu, M.C., & Wang, H.Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40, 92-118. https://doi.org/10.1111/j.1467-8535.2007.00809.x

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Mišljenja sveučilišnih studenata o mobilnom učenju: kvalitativna metasinteza prema ENTREQ izjavi (2000. – 2020.)

Sažetak

Razmatrajući koncepte poput e-učenja, mobilnoga učenja, učenja na daljinu i obrnute učionice, mjesto i važnost tehnologije u obrazovanju već su dugo vremena fokus istraživanja. Štoviše, tijekom recentne pandemije uzrokovane pojavom COVID-19 virusa u svijetu, model obrazovanja na daljinu pojavio se kao alternativa tradicionalnom obrazovnom sustavu učenja licem u lice. Iznad svega, većina sveučilišta širom svijeta usvojila je obrazovanje na daljinu i upotrebu mobilnih tehnologija kao neophodne, pa je tako važnost mobilnoga učenja postala još očitija. Ovim se istraživanjem nastojalo objasniti i raspraviti o rezultatima postojećih kvalitativnih istraživanja praksi sveučilišnih studenata i razloga zbog kojih prednost daju mobilnome učenju ili ga ne preferiraju, upotrebom sustavne istraživačke metode, tj. metasinteze. Rezultati ovoga istraživanja pokazuju da se razlozi preferiranja mobilnoga učenja mogu klasificirati u sljedeće kategorije: obrazovani razlozi, komunikacijski razlozi, olakšavanje života i uvjerenja. S druge strane, razlozi nepreferiranja mobilnoga učenja klasificirani su u kategorije tehničkih problema, ekonomskih problema, ergonomskih problema, uvjerenja i oslanjanja na obrazovanje licem u lice. Osim podudarnosti dobivenih rezultata s onima u literaturi, ova je studija usmjerila pozornost na stvaranje prilika za upotrebu obrazovanih aplikacija mobilnoga učenja, na pitanje sigurnosti osobnih podataka i otpor edukatora prema tehnologiji. Jedan od zaključaka ovoga istraživanja je i postojanje dvojakoga razumijevanja mobilnoga učenja, tj. percepcije m-učenja kao uštede ili gubitka vremena.

Ključne riječi: *kvalitativni rezultati; metasinteza; mobilno učenje; sveučilišni studenti.*

Uvod

Uvodni dio većine radova o temi obrazovnih tehnologija počinje izrazima poput *u svijetu razvoja, u svijetu koji se brzo mijenja, kako bi brzo pristupili znanju* itd. Obrazovna tehnologija u fokusu svakoga od tih izraza zapravo je mobilno učenje (m-učenje).

M-učenje ne samo da igra važnu ulogu u praćenju napretka i promjena u svijetu, već i osigurava kontinuitet obrazovanja u vremenima poput aktualne pandemije. Evolucija ručnih uređaja i bežične tehnologije rezultirala je promjenama u ekonomskom i društvenom stilu života modernoga čovjeka. Danas se mnogi tehnološki uređaji proizvode u prijenosnom obliku na koji su ljudi naviknuli (El-Hussein i Cronje, 2010). Napredak u području mobilne tehnologije ubrzanim tempom širi raspon učenja u područjima izvan formalnoga obrazovanja (npr. neformalno učenje), omogućavajući fleksibilan i trenutačan pristup bogatim digitalnim resursima. M-učenje također može igrati značajnu dodatnu ulogu unutar formalnoga obrazovanja. Potencijalne koristi m-učenja zagovaraju se zbog širokoga raspona svrha, uključujući uštedu, sveprisutnu komunikaciju, pomoć pri učenju i uslugu na mjestu korištenja (Cheon i sur., 2012). Lakoća pristupa alatima m-učenja, internet, proliferacija programa za mobilne uređaje i činjenica da je učenje Z-generacije uz tehnološke posrednike mnogo lakše i zabavnije, čimbenici su u pozadini široko raširene upotrebe m-učenja.

Širenje mobilne tehnologije, posebno mobilnih telefona, odvijalo se brzo i u razvijenim zemljama i u zemljama u razvoju (Kaliisa i Palmer, 2019). Širenjem mobilne računalne tehnologije, m-učenje će igrati vitalnu ulogu na brzo rastućem tržištu elektroničkoga učenja. M-učenje predstavlja isporuku materijala za učenje učenicima bilo kada i bilo gdje upotrebom bežičnoga interneta i mobilnih uređaja (Wang i sur., 2009). Termin mobilno odnosi se na mogućnost pojavljivanja na višestrukim mjestima u višestrukome vremenu i obradu raznolikih sadržaja uz upotrebu statičkih ili prenosivih uređaja poput bežičnih prijenosnih računala, PDA uređaja, tj. osobnih digitalnih pomoćnika i pametnih telefona (Sarrab i sur., 2012). Prakticirajući m-učenje studenti mogu iskoristiti svoje slobodno vrijeme kako bi se pripremili za nastavu, pristupajući nastavnim materijalima na nekoj od dostupnih *online* platformi za učenje (Yang i sur., 2019).

Broj studenata koji posjeduju mobilne uređaje također je u porastu. Osim toga, neka sveučilišta osiguravaju studentima pametne telefone kako bi pristupali besplatnim i konstruktivnim sustavima za upravljanje mobilnim učenjem (LMS). Očekuje se kako će se ovaj trend nastaviti i proširiti te da će cijena pametnih telefona i telekomunikacijski troškovi opadati. Stoga je nužno provesti istraživanje koje bi detaljnije ispitalo namjeru sveučilišnih studenata da koriste m-učenje kako bi dobili informacije za uspostavljenje sustava podrške m-učenju (Park i sur., 2012). M-učenje je prirodno proširenje e-učenja. Ima potencijal dodatno proširiti vrijeme, mjesto i način učenja studenata/učenika u svim aspektima njihovih života. Koristi m-učenja su sljedeće (Sarrab i sur., 2012):

– pristup sadržaju bez vremenskoga ograničenja
– pristup sadržaju bez obzira na mjesto
– podrška učenju na daljinu
– poboljšanje učenja usredotočenoga na učenika
– prigodno za učenje ili ponavljanje sadržaja u zadnji čas
– učinkovitija upotreba za učenike različitih sposobnosti
– diferencijacija učenja prema potrebama i personalizirano učenje

– pojačana međusobna interakcija učenika te između učenika i učitelja
– smanjivanje kulturnih i komunikacijskih barijera između nastavnika i studenata upotrebom komunikacijskih kanala koje studenti vole.

Dok s jedne strane m-učenje ima potencijal podrške svih razina obrazovanja, visoko obrazovanje posebno je primjereno područje za integraciju na studenta usredotočenoga m-učenja jer su mobilni uređaji na sveučilištima postali sveprisutni. U visokom obrazovanju primjenjivani su razni pokušaji m-učenja (Cheon i sur., 2012). Unatoč ogromnom rastu i potencijalu uređaja i mreža, bežično e-učenje i m-učenje još su uvijek u početnoj fazi, tj. začetnom stadiju te je mogućnost trenutačnoga pristupa učenju u bilo koje vrijeme i na bilo kojemu mjestu svakako velika prednost, koja će ipak biti ograničena dok se tehnologija bežičnoga pristupa podatcima ne razvije u potpunosti i edukatori ne nauče kako primjenjivati ranije spomenute pedagogije, kako socijalno-konstruktivističke tako i konverzacijske teorije (Motiwalla, 2007). Mnogi sveučilišni profesori, nesigurni u vlastitu uporabu tehnologije, osjećaju prijetnju tih novih komunikacijskih oblika, znajući da u mnogim slučajevima njihovi studenti imaju veću kompetenciju od njih (Herrington i Herrington, 2007). Unatoč činjenici što m-učenje ima sve veću vidljivost i važnost u visokome obrazovanju, mobilno obrazovanje, koliko god bilo inovativno, tehnički izvedivo i pedagoški osnovano možda nema priliku za održivu široku institucionalnu upotrebu u visokom obrazovanju u skoroj budućnosti, bilo da je riječ o obrazovanju na daljinu ili uživo (Traxler, 2007).

Iako mnogi rezultati istraživanja u literaturi ukazuju na važnost m-učenja i njegovu široku primjenu u visokom obrazovanju (Cheon i sur., 2012; Nassuora, 2013), neke studije izvješćuju da m-učenje još nije dosegnulo očekivanu razinu učinkovitosti (Traxler, 2007), da tehnološka infrastruktura i razvojna razina zemalja negativno utječu na taj proces (Kaliisa i Palmer, 2019) te da su sustavi m-učenja neprimjereni (Al-Emran i sur., 2016). U ovom istraživanju ispitali su se stavovi studenata visokoga obrazovanja o m-učenju kroz metasintezu na međunarodnoj razini. Smatralo se da usporedba i analiza postojećih rezultata istraživanja studentskih stavova o m-učenju u literaturi može pridonijeti razumijevanju ovoga područja.. Glavno istraživačko pitanje bilo je sljedeće: Koji su stavovi sveučilišnih studenata, s obzirom na njihovo iskustvo, o m-učenju ? Osim toga, razvijena su i dva istraživačka potpitanja:

– Koji su razlozi zbog kojih sveučilišni studenti daju prednost m-učenju?
– Koji su razlozi zbog koji sveučilišni studenti ne daju prednost m-učenju?

Metoda

Dizajn istraživanja

Ovo istraživanje temeljilo se na metodi metasinteze, tj. na sintezi postojećih istraživanja koja su iznijela kvalitativne podatke. Iako je metasinteza često korištena metoda u području zdravstvenih znanosti, ona je posljednjih godina sve značajnija i u obrazovnim znanostima. Prema Walshu i Downeu (2005) pokušaj integracije

određenoga broja različitih, ali međusobno povezanih kvalitativnih studija i tehnika u sklopu metasinteze kvalitativnih istraživanja ima prije interpretativnu nego kumulativnu namjeru, za razliku od metasinteze kvantitativnih istraživanja.

Što se tiče zahtjeva ranije definirane metode metasinteze, cilj ovoga istraživanja bio je istražiti stavove sveučilišnih studenata o m-učenju, teškoće s kojima se suočavaju tijekom m-učenja i razloge zbog kojih preferiraju m-učenje, putem sinteze kvalitativnih podataka iz primarnih izvora. S obzirom na to da se kvaliteta metasinteze temelji na dobro postavljenom istraživačkom pitanju, relevantna literatura o upotrebi mobilne tehnologije u visokom obrazovanju pregledana je u početnoj fazi istraživanja, kako bi se utvrdio cilj studije. Na osnovi spomenute revizije literature, fokus je usmjeren na razloge iz kojih sveučilišni studenti s iskustvom m-učenja preferiraju ili ne preferiraju m-učenje. Na taj način došlo se do istraživačkoga pitanja studije. Sveobuhvatan pregled literature zasnivao se na ključnim konceptima: e-učenje, mobilno učenje, stavovi o e-učenju i stavovi o mobilnom učenju. Studije izdvojene u pretraživanju literature pregledane su s obzirom na kriterije uključivanja i izostavljanja te je u metasintezu uključeno 10 istraživanja. Procjenu kvalitete odabranih istraživanja provela su dva stručnjaka uz pomoć CASP, a pouzdanost između kodera utvrđena je upotrebom Krippendorffova alfa koeficijenta.

Istraživači su više puta pregledavali sva istraživanja, komparativnim redoslijedom, kako bi pronašli originalne izjave sveučilišnih studenata o razlozima zbog kojih preferiraju m-učenje i izjave autora izvornih istraživanja kojima tumače favoriziranje m-učenja. Slični rezultati pregledanih istraživanja grupirani su i apstrahirani te je izračunata veličina učinka frekvencije svakoga rezultata s ciljem da interpretacija rezultata, putem određivanja učestalosti i važnosti, bude razumljivija. Naposljetku su razvijene nove i uobičajene kategorije proizašle iz sinteze istraživanja. Pretraživanje se zasnivalo na sljedećim koracima metode metasinteze.

Prema Erwinu i suradnicima (2011), istraživački proces metasinteze sažet je u šest koraka koji obuhvaćaju osnovni opis kvalitativne metasinteze s primjerima iz literature. Šest koraka istraživačkoga procesa kvalitativne metasinteze su:

Korak 1. Formuliranje jasnoga istraživačkoga problema i pitanja
Korak 2. Sveobuhvatno pretraživanje
Korak 3. Pažljiva procjena istraživačkih studija radi mogućnosti uključivanja
Korak 4. Odabiranje i provođenje tehnika metasinteze kako bi se integrirali i analizirali kvalitativni rezultati istraživanja
Korak 5. Sinteza rezultata uključenih istraživanja
Korak 6. Razmišljanje o procesu

Korak 1. Formuliranje jasnoga problema i istraživačkoga pitanja: Jasna prezentacija istraživačkoga problema u studijama metasinteze od primarne je važnosti za razumijevanje rezultata i provođenje budućih postupaka bez pogreške. Stoga je problem podijeljen

u dva dijela, kako bi analiza bila lakša i razumljivija. U prvom dijelu analizirani su razlozi studenata za preferiranje m-učenja nakon što su ga iskusili, a u drugom dijelu ispitivani su razlozi zbog kojih ne preferiraju navedeni oblik učenja.

Korak 2. Sveobuhvatno pretraživanje literature: Kako bi se pronašlo relevantne kvalitativne studije u periodu između 2000. i 2020. godine, korištene su baze podataka *Google Scholar, ERIC, ProQuest* i *ResearchGate*. Godina 2000. odabrana je kao početna jer su istraživanja m-učenja i e-učenja započela upravo te godine (McConatha i sur., 2008). U pretraživanju su korištene ključne riječi poput „e-učenje", „mobilno učenje", „stavovi o e-učenju" i „stavovi o mobilnom učenju".

Korak 3. Pažljivo vrednovanje istraživačkih studija zbog mogućega uključivanja: nakon primjene kriterija uključivanja i izuzimanja (prikazanih u Tablici 1) u trenutačnu metasintezu, uključeno je 10 istraživanja (Slika 1). S obzirom da istraživanja zasnovana na metodi metasinteze zahtijevaju dubinsku analizu i bogatu interpretaciju, preporuka je da budu ograničena na 10-12 studija (Bondas i Hall, 2007).

Tablica 1.

Kriteriji za uključivanje ili izuzimanje studija prikazani u Tablici 1 postavili su autori s obzirom na principe metode metasinteze i posebnosti fokusa ovoga istraživanja. U metasintezu uključena su istraživanja s kvalitativnim podatcima zasnovanim na stavovima sveučilišnih studenata o m-učenju nakon što su ga iskusili, objavljena u prestižnim akademskim časopisima između 2000. i 2020. godine. S druge strane, studije koje uključuju samo kvantitativne podatke, pregledne studije, one koje uključuju stavove studenata bez prijašnjega iskustva m-učenja i istraživanja koja nisu na engleskom jeziku izuzeta su iz metasinteze. Slika 1 prikazuje dijagram tijeka procesa uključivanja.

Slika 1.

Pronađeno je ukupno 107 studija prema kriterijima uključivanja. Ipak, 97 istraživanja za koja u bazama podataka nije nađen puni tekst, radovi iz konferencijskih zbornika, studije samo s kvantitativnom analizom podataka i one s neprimjerenim podatcima bile su izuzete iz procesa. Slijedeći smjernice izjave Povećanja transparentnosti u izvješćivanju o rezultatima kvalitativnih istraživanja (ENTREQ) za sustavne revizije, 10 istraživanja je uključeno u analizu.

Vrednovanje kvalitete radova važan je stadij ovoga procesa jer osigurava vrijednost i cjelovitost podataka korištenih istraživanjima zasnovanima na metasintezi. Kako bismo procijenili kvalitetu radova koji su koristili kvalitativne metode, upotrijebili smo CASP program koji se sastoji od ukupno deset pitanja, od kojih se dva odnose na primjerenost cilja i kvalitativne metode istraživanja, a osam na dizajn istraživanja (strategiju uzorkovanja, prikupljanje podataka, pristranost istraživača, etička pitanja, analizu podataka, rezultate i vrijednost istraživanja) (Sibeoni i sur., 2017).

Utvrđivanje kvalitete uključenih studija važno je zbog osiguravanja pouzdanosti provedene sinteze istraživanja. Rezultat kvalitete izračunava se na osnovi kriterija

koji su razvili Pluye i suradnici (2009) za metodičku procjenu primarnih istraživanja putem kvalitativnih, kvantitativnih i miješanih metoda korištenim u zdravstvenim znanostima, a zasnovani su na sljedećoj formuli: rezultat kvalitete = broj zadovoljenih kriterija / ukupan broj kriterija x 100. Ipak, rezultat kvalitete izračunat je uzimajući u obzir kriterije CASP-a koji su primjereniji za procjenu kvalitativnih studija. Tablica 2 prikazuje kriterije koje su zadovoljila uključena istraživanja, zasnovane na procesu kodiranja koje su provela dva stručnjaka. Na primjer, prema procjeni prvoga stručnjaka, Jamesova studija (2011) zadovoljila je devet kriterija. Rezultat kvalitete izračunat je uz upotrebu gore navedene formule kao (9/10) x 100 = 90. Općenito, smatra se da istraživanja s rezultatom od 70 % i višim, od najmanje jednoga stručnjaka imaju prihvatljivu kvalitetu (Sibeoni i sur., 2017).

Dva stručnjaka vrednovala su istraživanja prema kvaliteti, a razina pouzdanosti između ta dva ocjenjivača utvrđena je upotrebom Krippendorffova alfa koeficijenta (Hayes i Krippendorff, 2007). Ova mjera pouzdanosti primjenjiva je za sve vrste varijabli i bilo koji broj vrijednosti dva ili više ocjenjivača. U ovoj studiji konzistentnost je izračunata kao $\alpha = 0{,}83$, a $\alpha > 0{,}80$ pokazuje visoku razinu pouzdanosti (Hayes i Krippendorff, 2007). Tablica 2 predstavlja rezultate evaluacije stručnjaka i evaluaciju kvalitete istraživanja na osnovi CASP.

Tablica 2.

Karakteristike studija odabranih za metasintezu (n = 10) prikazane su u Tablici 3: ime autora, istraživačka metoda, sredstva prikupljanja podataka, veličina uzorka, vrsta mobilnoga uređaja korištenoga u istraživanju, analiza podataka, vrsta istraživanja, zemlja u kojoj je istraživanje provedeno i baze podataka u kojima su istraživanja nađena.

Korak 4. Odabir i primjena tehnike metasinteze kako bi se integrirali i analizirali kvalitativni rezultati istraživanja: Primijenjena je sustavna metoda kojom se komparativno analiziralo uključene studije. Ovaj pristup predstavlja sintezu tehnika koje su opisali Campbell i suradnici (2003), Noblit i Hare (1988) i Tong i suradnici (2008) (prema Erwin i sur., 2011). Prema Erwinu i suradnicima (2011) istraživači su više puta čitali radove kako bi osigurali upotrebu podataka prvoga, drugoga i trećega reda u analizi i reinterpretaciji rezultata dobivenih u izvješćima istraživanja. Podatci prvoga reda su citati iz primarnih istraživanja, podatci drugoga reda su interpretativne teme koje su razvili istraživači, a podatci trećega reda nove i zajedničke kategorije dobivene u sintezi uključenih istraživanja.

Korak 5. Sinteza rezultata odabranih istraživanja: Najvažniji korak metasinteze istraživanja jest sinteza kvalitativnih podataka. U ovom kontekstu predstavljeni su podatci prvoga i drugoga reda svake studije. Kao što je prikazano u Tablici 3, studije uključene u istraživanje nazvane su R1, R2 itd. Stoga su tvrdnje sudionika primarnih istraživanja kodirane, na primjer, kao R3: 1, R3 za tvrdnju prvoga sudionika i R3: 2, R3 za tvrdnju drugoga sudionika.

Rezultati

Rezultati vezani za prvo istraživačko potpitanje: Zašto sveučilišni studenti preferiraju m-učenje?

Na osnovi rezultata metasinteze istraživanja koja su ispitivala stavove sveučilišnih studenata o iskustvu m-učenja, njihovi razlozi za davanje prednosti m-učenju klasificirani su u kategorije obrazovnih razloga, komunikacijskih razloga, olakšavanja života i uvjerenja. Kako bi se ustanovila važnost izjava, izračunate su veličine učinka frekvencije upotrebom sljedeće formule: broj izjava u kojima je nalaz preferencije – broj duplih izjava/ukupan broj istraživanja koja su ispitivala ovaj konstrukt (Sandelowski i Barroso, 2007, str. 160). Veličine učinka frekvencije izračunate su zbrajanjem rezultata sličnih kvalitativnih istraživanja, kako bi se u sljedećoj fazi provelo njihovo tumačenje utvrđivanjem suvremenosti i važnosti rezultata (Onwuegbuzie, 2003; Onwuegbuzie i Teddlie, 2003). Kodovi i veličine učinka frekvencija u kategoriji obrazovnih razloga predstavljeni su u Tablici 4.

Obrazovni razlozi

Tablica 4.

Kod *učenje neovisno o vremenu i prostoru* ima najveći učinak frekvencije u kategoriji obrazovne prednosti m-učenja. Dok je sudionik kodiran kao R6:1 u istraživanju Abu-Al-Aish i suradnika (2012) izjavio: *„To bi omogućilo studentima da uče dok su vani, na primjer, u vlaku ili autobusu, i bilo bi ogromna pomoć,* " sudionik R9: 1 u istraživanju Nalliveettil i Alenazija (2016) je izjavio: „*Mobilni telefoni dostupni su nam bilo kada i možemo ih koristiti bez vremenskoga ograničenja*". Razmatrajući citate autora primarnih istraživanja, Abas i suradnici (2009) tvrde: „Mobilno učenje ima potencijal povećavanja fleksibilnosti učenja u ODL institucijama. Učenje dovodi direktno u domove, na radna mjesta i u zajednicu. M-učenje je spontano i prijenosno, neometano i sveprisutno. Iznad svega, u okolini učenja na daljinu (ODL), koja omogućuje učenje „bilo gdje i bilo kada", m-učenje približava edukatora učeniku." Motiwalla (2007) tvrdi: „M-učenje povećava fleksibilnost učenja jer se može učiti bilo kada i bilo gdje." Osim toga, Teodorescu (2015) je proučavao iskustva sveučilišnih studenata s m-učenjem i otkrio da oni percipiraju prednosti m-učenja poput mogućnosti korištenja interaktivnih aplikacija, raznolikosti sredstava, autonomije i fleksibilnosti, učenja u pokretu, povećanja samopouzdanja i trenutačne povratne informacije. Osim toga, u prvom desetljeću 21. stoljeća definicija m-učenja rafinirana je različitim oblicima i aspektima. Prema Baranu (2014) glavni fokus tih definicija uključuje pozitivne osobine m-učenja poput mobilnosti (Sharples i sur., 2009), pristupa (Parsons i Rye, 2006) i trenutačnosti (Kynäslahti, 2003).

Ostali kodovi s visokim učincima frekvencije u kategoriji obrazovanih razloga za davanje prednosti m-učenju su *mogućnost individualnoga učenja* i *mogućnost proširenja znanja.* Dok je sudionik R8: 1 u istraživanju Kima i suradnika (2013) u vezi s prvim navedenim razlogom rekao: „*To je dobar alat za personalizirano učenje,*" sudionik R4: 1

u Jamesovom istraživanju (2011) izjavio je: „*Svi učimo na različite načine, a tehnologija bi nam trebala pomoći da činimo upravo to.*" Razmatrajući citate autora primarnih istraživanja navodimo riječi Kima i suradnika (2013): „U ovom smo istraživanju kreirali personalizirano i smisleno iskustvo učenja bez obzira na vrstu korištenoga mobilnog uređaja u aktivnostima učenja." U vezi s tvrdnjom da m-učenje omogućuje proširenje znanja, sudionik R3: 1 iz Donaldsonove studije (2011) izjavio je: „*Na Wikipediji sam tražio podatke za sat američke povijesti i što sam više informacija pročitao, to sam imao veću želju proučavati različite stranice i razne teme pa sam završio na, kao, nečemu što mi je kasnije poslužilo kao… uvod u ono što sam učio.*" Donaldson (2011) je ovu temu protumačio na sljedeći način: „Pet studenata prepoznalo je upotrebu mobilnih uređaja kao put k intelektualnom istraživanju poput čitanja izvan granica obaveznih predmeta na Wikipediji ili zaboravljanje na vrijeme tijekom uživanja u istraživanju." Agca i Özdemir (2013) istraživali su upotrebu mobilne tehnologije sveučilišnih studenata u učenju stranoga vokabulara i ustanovili da studente ne samo da traže strane riječi, već su sposobni i pristupiti drugim informacijama vezanima za njih. Kada se razmatraju obrazovne prednosti, ova izjava podupire činjenicu da m-učenje omogućuje proširenje znanja.

Još jedan kôd koji se većinski pojavljivao unutar obrazovanih razloga jest sposobnost korištenja obrazovanih aplikacija. U njim u vezi sudionik R3: 2 u Donaldsonovom (2011) istraživanju tvrdi: „*Zajedno mi aplikacije Zadaća i Moja matematika, koja mi omogućuje korištenje matematičkih formula, daju puno informacija, znate, u tome. I to mi samo tako, kao, pomaže da organiziram misli,*" dok je sudionik R10: 1 u Yılmazovom (2016) istraživanju rekao: „*Možemo preuzimati posebne obrazovne aplikacije poput simulacija, animacija itd., i koristiti ih kao dodatak teorijskoj nastavi.*" Aish i suradnici (2012) elaborirali su takve situacije: „Među studentima su popularni pametni telefoni s naprednim mogućnostima upotrebe i internetskom vezom. Najpopularnije aktivnosti učenja kojima ti uređaji pristupaju su sveučilišni raspored, U-link, upotreba mobilnih aplikacija za pretraživanje tutorijala za teška matematička pitanja (tj. *Wolfram Calculus Course Assistant*) i znanstveni kalkulator."

Među ostalim kodovima s nižim veličinama učinka frekvencije u kategoriji obrazovnih razloga su *mogućnost ponavljanja* i *pojednostavljivanje sadržaja.* U vezi s kôdom *mogućnost ponavljanja* sudionik R10: 2 u Yilmazovoj studiji izjavio je: „*Možemo gledati videa snimljena na nastavi*". Davies i suradnici (2012) protumačili su ovu situaciju kako slijedi: „Studenti smatraju da trenutačni pristup koji omogućuje mobilna tehnologija daje priliku višekratno pretraživati informacije s lakoćom, osnažujući njihovo znanje. Prepoznali su ovo kao važan dio učenja i cijenili dobivenu priliku." Osim toga, u vezi s kôdom *pojednostavljivanje sadržaja* sudionik R5: 1 u istraživanju Sukija i Sukija (2011) je rekao: „*Da, teško je učiti kolegij Povijest umjetnosti i proces dizajna, volio bih ga savladavati pristupom mobilnoga učenja.*" Ipak, s obzirom na temu *primjerenost jednostavnom sadržaju,* sudionik R5: 2 je rekao: „*Da, dobro je za učenje jednostavnoga sadržaja*".

Komunikacijski razlozi

Kodovi i veličine učinka frekvencije u kategoriji komunikacijskih razloga za davanje prednosti m-učenju prikazani su u Tablici 5.

Tablica 5.

Kod *prilika za učinkovitu komunikaciju* u kategoriji komunikacijskih razloga za davanje prednosti m-učenju ima najveći učinak frekvencije. U vezi s tim kodom sudionik R3: 3 u Donaldsonovom istraživanju (2011) je rekao: „*Svakako mi omogućuje bolju komunikaciju. Prije nego što sam dobio mobilni telefon, znalo je proći dva do tri dana, a da ne vidim e-pismo od profesora. Sada ga vadim puno češće.*" Dok su Aish i suradnici (2013) tumačili ovu temu na sljedeći način: „Unaprijedit će komunikaciju između studenata i predavača", Kim i suradnici (2013) dodali su: „Većina sudionika izjavila je da platforme za raspravu imaju mnoge dobre strane (npr. pisanje i dijeljenje poruka) kao alat *online* suradnje u aktivnostima mobilnoga učenja." Osim toga, o kodu *uspostavljanje online platforme za raspravu,* sudionik R8: 2 u istraživanju Kima i suradnika (2013) je izjavio: „*Smatram da je to koristan alat (online platforma za raspravu) za komunikaciju…*" Istražujući preferencije sveučilišnih studenata za korištenje mobilnih usluga, Trifonova i Georgijeva (2006) ustanovile su da 65 % studenata komunicira sa svojim profesorima, a 53,7 % komunicira s drugim studentima.

Olakšavanje života

Kodovi i veličine učinka frekvencije u kategoriji *m-učenje olakšava život* prikazani su u Tablici 6.

Tablica 6.

Kod *korisnost* ima najveći učinak frekvencije u kategoriji *m-učenje olakšava život.* Sudionik R7: 1 spomenuo je ovaj kôd u istraživanju Deviesa i suradnika (2012): „*Kada vidite pacijenta i u isto vrijeme možete dobiti informaciju.*" U istom istraživanju ova je situacija elaborirana na sljedeći način: „Početne percepcije prednosti korištenja osobnoga digitalnog pomoćnika (PDA uređaja) u medicinskom obrazovanju bile su trenutačni pristup i prijenos uređaja." O kodu *ušteda vremena* izrazio se sudionik R5:3 u istraživanju Sukija i Sukija (2011): „*Sviđa mi se zamisao. Pomaže mi kad god predavač nije prisutan. Spašava me u smislu vremena.*" Aish i suradnici (2012) objasnili su ovu situaciju sljedećim riječima: „M-učenje može studentima uštedjeti vrijeme." Kod *lakoća* objasnio je sudionik R9:2 u Nalliveettilovoj i Alenazijevoj studiji (2016): „*Ako trebate naći riječi u knjizi (tiskanoj), ponekad trebate okrenuti mnogo stranica, a s mobilnim telefonom je lako tražiti i pronaći riječi".* Suki i Suki (2011) o ovome pitanju u svojem istraživanju iznose ovo: „Šest je studenata koji su zastupali ideju da mobilna tehnologija može unaprijediti njihovo znanje. To je zbog čimbenika veličine i pogodnosti mobilnih uređaja koje su mogli lako nositi i pristupiti im u pokretu."

Ostali kodovi u kategoriji *olakšavanje života* su *planiranje* i *primjerenost našemu dobu.* Kôd *planiranje* spomenuo je sudionik R3: 4 u istraživanju Donaldsona (2011): „*Pomaže*

mi upravljati vremenom i povećava moju produktivnost." Abas i suradnici (2009) objasnili su ovu situaciju sljedećim riječima: „Većina učenika bila je entuzijastična zbog upotrebe SMS-a za prenošenje informacija o kolegiju – poput rasporeda i dogovora." Kôd *primjerenost našemu vremenu* izrazio je sudionik R9: 3 u Nalliveettilovom i Alenazijevom istraživanju (2016): „*U ovome stoljeću ne možemo zamisliti život bez mobitela.*" Donaldson (2011) je interpretirao ovu situaciju: „Jedan ispitanik razmišljao je o tome kako će mu odrastanje u digitalnom dobu olakšati upotreba mobilnih uređaja." Ravnoteža između pristupa obrazovanju i obiteljskoga života o kojoj izvještava sustavna analiza istraživanja iskustava sveučilišnih studenata s *online* nastavom Blackmona i Majora (2012) sukladna je kodovima *planiranje* i *ušteda vremena* ovoga istraživanja. Jacob i Issac (2008) utvrdili su da 66 % studenata navodi kako bi trebalo podržati m-učenje u našem, digitalnom dobu. Osim toga, Corlett i suradnici u svojem su istraživanju (2015) došli do zaključka da, osim komunikacijskih mogućnosti, studenti koriste opcije kalendara i rasporeda na mobilnim uređajima, što podupire dimenziju *planiranja* u našemu istraživanju.

Uvjerenje

Kodovi i frekvencije veličine učinka frekvencije u kategoriji *uvjerenje* za davanje prednosti m-učenju prikazani su u Tablici 7.

Tablica 7.

Kôd *pozitivan stav* ima najveći učinak frekvencije u kategoriji *uvjerenje.* O tome kodu se izrazio sudionik R2: 1 u istraživanju Abasa i suradnika (2009): „*Osjećali smo se jako posebno,*" a u istraživanju Aisha i suradnika (2012) o toj temi je rečeno: „Rezultati istraživanja pokazuju da studenti imaju pozitivnu percepciju m-učenja i da ga vide kao podršku tradicionalnom učenju." Osim toga, sudionik R2: 2 u istraživanju Abasa i suradnika (2009) spomenuo je kôd *povećava motivaciju* sljedećim riječima: „*Mislim da ova vrsta riječi stvarno motivira,*" a Donaldson (2011) je interpretirao ovu situaciju u svojem istraživanju: „Komentari sudionika također govore da praktičnost pristupanja informacijama na mobilnim uređajima pridonosi njihovom uživanju." Upotreba mobilnih uređaja za pristupanje sadržaju stvara prilike za učenje koje povećavaju motivaciju učenika/studenata (Ally i sur., 2007; Mendez-Coca i Silisko, 2013).

Rezultati vezani za drugo istraživačko potpitanje: Zašto sveučilišni studenti ne preferiraju m-učenje?

Zasnovano na rezultatima dobivenima u metasintezi istraživanja stavova sveučilišnih studenata o iskustvima m-učenja, njihovi razlozi za nedavanje prednosti m-učenju klasificirani su u kategorije tehničkih problema, ekonomskih problema, ergonomskih problema, uvjerenja i oslanjanja na obrazovanje licem u lice. Kodovi i veličine učinka frekvencije u kategoriji *tehničkih problema* prikazani su u Tablici 8.

Tehnički problemi

Tablica 8.

Kodovi s najvišim učinkom frekvencije u kategoriji *tehnički problem* su *problemi s datotekama*, *spora veza i loš signal* i *problemi s aplikacijama*. O kodu *problemi s datotekama* sudionik R3: 5 u Donaldsonovom (2011) istraživanju je rekao: *„Moj telefon ne može otvoriti i uređivati datoteke. Isto je s preuzimanjem i pregledavanjem PPT. Mogu preuzimati male word ili PPT datoteke, ali ne velike. To je gnjavaža jer traje dugo.“* Donaldson (2011) je razjasnio ovu situaciju u svojem istraživanju: „Sudionici u ovom istraživanju također spominju nemogućnost gledanja videa ili pristupa određenim mrežnim stranicama zbog nedostatka nekih značajki, npr. programa *JavaScript* ili *Flash*." Dok je kôd *spora veza i loš signal* sudionik R8: 3 u istraživanju Kima i suradnika (2013) opisao sljedećim riječima: *„Nedostatci su spora veza s internetom…,"* drugi sudionik, u Jamesovom istraživanju (2011) rekao je: „…čak kada smo u gradu, signal nekada nije baš dobar." Donaldson (2011) je objasnio ovo pitanje: „Ispitanici u intervjuu identificirali su fizičke aspekte mobilnih tehnologija poput malih ekrana, slabe rezolucije, trajanja baterije, mogućnosti pregledavanja i uređivanja datoteka, radne brzine, sporoga preuzimanja i raznolike operativne sustave kao prepreke prihvaćanju mobilnoga učenja." Alrasheedi i suradnici (2015) proveli su sustavan pregled postojećih istraživanja kako bi otkrili čimbenike koji su utjecali na postignuće studenata u m-učenju i utvrdili da oko 38,65 % od 1565 ispitanika nije imalo pristup internetu, što je sukladno rezultatima ove studije. Osim toga, Corlett i suradnici (2015) navode kako su sudionici u njihovom istraživanju bili zabrinuti da se dokumenti u mobilnim aplikacijama neće moći lako upotrijebiti u drugim programima i uređajima nakon kolegija. Ovaj nalaz sukladan je kodu *problemi s datotekama* kao razlogu za nedavanje prednosti m-učenju.

O kodu *problemi s aplikacijama* sudionik R4: 3 u Jamesovom (2011) istraživanju je izjavio: *„Kupio sam ovaj telefon za sebe, ne za nastavne materijale – oni zauzimaju puno memorije i ostavljaju malo prostora za moje fotografije i videa."* Abas i suradnici (2009) u vezi s ovim pitanjem ustvrdili su: „Nedostatak smjernica ili uputa o tome što bi studenti trebali činiti doveo je do osjećaja frustracije." Nadalje, kôd *sigurnost osobnih podataka* izrazio je sudionik R9: 4 u Nalliveettilovom i Alenazijevom istraživanju (2016): *„Potrebno je voditi brigu o sigurnosti uređaja i osobnih podataka."*

Kôd *neprimjerenost uređaja za m-učenje* spomenuo je sudionik R5: 4 u istraživanju Sukija i Sukija (2011): *„Moj telefon nema napredne opcije kao pametni telefon."* U istom istraživanju ovo je pitanje tumačeno na sljedeći način: „Oni su također bili suočeni s problemima navigacije zbog ograničenja uređaja." Razmatrajući kôd *problemi s operacijskim sustavom,* sudionik R3: 6 u Donaldsonovoj (2011) studiji rekao je: *„Prebaciti Android telefon na Blackboard sustav je noćna mora…"* Osim toga, Kim i suradnici (2013) objasnili su: „Studenti su suočeni s neočekivanim praktičnim pitanjem programa *Voice Thread* (za vrijeme istraživanja postojala je aplikacija za Appleov iPhone, ali ne za Android telefone). Suočeni s ovom preprekom, korisnici Androida zamijenili su ih

s prijenosnim računalima kako bi završili svoje projekte. Čini se da su mnoge od tih tehnologija, iako dobro dizajnirane za svrhe zabave, postale manje podobne korisniku kada ih se primjenjuje u pedagoškim aktivnostima."

Osim toga, kôd *loša rezolucija* spomenuo je sudionik R5: 5 u istraživanju Sukija i Sukija (2011): „*Rezolucija ekrana ograničava moje iskustvo učenja*". Oni su ovo pitanje protumačili na sljedeći način: „Nadalje, iskustvo gledanja i učenja nije dovoljno jasno zbog male veličine i rezolucije ekrana."

Ekonomski problemi

Kodovi i veličine učinka frekvencije u kategoriji *ekonomski problem* predstavljeni su u Tablici 9.

Tablica 9.

Od kodova u kategoriji ekonomskih problema, *skupoća mobilnih uređaja* imala je najveći učinak frekvencije. O ovom kodu izrazio se sudionik R4: 4 u Jamesovoj (2011) studiji: „*Moraš biti bogat da imaš uređaj koji je uvijek povezan. Mislim...hm…veliki je to mjesečni trošak… to si sada ne mogu priuštiti.*" Yılmaz (2016) je ovo pitanje objasnio na sljedeći način: „Kao što je poznato, svi tehnološki uređaji trebaju se mijenjati novima s vremenom. Ova zamjena je financijski teret za škole." Dok je u vezi s kodom *visoko cijene interneta* sudionik R6: 2 u istraživanju Aisha i suradnika (2012) izjavio: „C*ijene interneta su previsoke ako ga se previše koristi,*" drugi je sudionik u istome istraživanju, R6: 3, izjavio: „*Ljudi će ga nedovoljno koristiti"* u vezi s kodom *manjak primjerenoga sudjelovanja.* S obzirom na navedeno, mnoga istraživanja naglašavaju probleme vezane za cijenu mobilnih uređaja (Börner i sur., 2010; Naismith i Corlett, 2006; Trifonova i Georgieva, 2006).

Ergonomski problemi

Kodovi i veličine učinka frekvencije u kategoriji *ergonomski problem* prikazani su u Tablici 10.

Tablica 10.

Među kodovima u kategoriji ergonomskih problema, *mali ekran* imao je najveći učinak frekvencije. Ovaj kôd naveo je sudionik R8: 4 u istraživanju Kim i suradnika (2013): „*Bilo je neugodno čitati mišljenja drugih na malim uređajima.*" Donalldson (2011) razjašnjava ovo pitanje: „…mali ekrani prepreka su korištenju mobilnih uređaja za učenje. Još specifičnije, mali ekrani priječe mogućnost čitanja teksta i unosa informacija u isto vrijeme." Drugi kôd s visokim učinkom frekvencije bio je *mala tipkovnica,* koji je spomenuo sudionik R8: 5 u istraživanju Kima i suradnika (2013): „*Loše strane su sporije povezivanje s internetom i mala tipkovnica.*" Ova pitanja protumačena su u istraživanju Motiwallae (2007) na sljedeći način: „Većina studenata u našemu uzorku smatra da je vrlo teško upravljati ekranom i tipkovnicom mobitela tijekom čitanja i pisanja poruka." Ally i suradnici (2007) tvrde da mali ekrani otežavaju fokus na učenje

zbog stalne navigacije između stranica, ali ta ograničenja postupno će ukloniti stalni napredak mobilnih tehnologija. Mala veličina ekrana i ograničena interakcija smatraju se manjkavosti mobilnih uređaja u usporedbi sa stolnim računalima. Eksperimentalna studija Hürsta i suradnika (2007) pokazala je da, bez obzira na ograničenja, mobilni medija *playeri* imaju potencijal za promociju učenja. 54 % studenata u istraživanju Jacoba i Issaca (2008) smatraju da mobilni uređaji trebaju imati veće ekrane.

Osim toga, kôd *problem u korištenju uređaja* spomenuo je sudionik R7: 2 u istraživanju Daviesa i suradnika (2012): *„Jedino što nemate toliko džepova – ja sigurno nemam. Tako da bih znao imati novčanik u jednom džepu i telefon u drugom, jer ne možete ostaviti telefon kod kuće – i bilo mi je prilično teško stalno ga nositi sa sobom."*

Uvjerenje

Kodovi i veličine učinka frekvencije u kategoriji *uvjerenje* su predstavljeni u Tablici 11.

Tablica 11.

U skupini kodova u kategoriji *uvjerenja*, *negativan stav prema mobilnim uređajima* i *uvjerenje da nisu primjereni za učenje* imaju najviše učinke frekvencije. Negativan stav prema mobilnim uređajima izrazio je sudionik R9: 5 u Nalliveettilovom i Alenzijevom (2016) istraživanju: *„Mislim da je korištenje mobilnih uređaja u učionici vrlo loše."* Suki i Suki (2011) objašnjavaju: „Mnogi studenti nevoljko su koristili mobilnu tehnologiju za učenje jer nisu bili upoznati s ovom novom zamisli učenja. Prije su učili u ateljeima i stoga nisu bili otvoreni za ovaj koncept učenja." Kôd *uvjerenje da nisu primjereni za učenje* izrazio je sudionik R9: 6 u istraživanju Nalliveettila i Alenazija (2016): *„Pametni telefoni su dobri za komunikaciju, ali ne za učenje. Ne koriste svi ljudi pametne telefone u učenju*." Osim toga, vezano za kôd *vjerovanje da predstavljaju gubitak vremena,* sudionik R6: 4 u istraživanju Aisha i suradnika (2012) izjavio je: *„Može se doživljavati više kao gubitak nego ušteda vremena,"* dok je u odnosu na kod *otpor edukatora prema tehnologiji,* sudionik R6: 5 izjavio: *„Profesori su oni koji nevoljko prihvaćaju promjenu. Na primjer, oni koji iz godine u godinu rade ista predavanja i oni koji još uvijek radije koriste projektore nego da primjene učinkovitije tehnologije."* Davies i suradnici (2012) protumačili su otpor edukatora na sljedeći način: „Da su profesori motiviraniji i da zagovaraju njihovu primjenu u vizitama na odjelu i u klinikama, tada bi i studenti bili skloniji uključiti ih u svoju rutinu." Kôd *uvjerenje da je m-učenje gubitak vremena* iz ove kategorije i kod *ušteda vremena* u kategoriji *olakšavanje* života, što predstavlja prednosti m-učenja, ukazuju na očitu podijeljenost, tj. neodlučnost u literaturi.

Kôd *pogrešno shvaćanje upotrebe mobilne tehnologije* opisan je izjavom sudionika R7: 3 u studiji Daviesa i suradnika (2012): *„Mislim da su neki doktori komentirali nešto kao što radimo na tome, šaljemo poruke ili igramo igrice."* Suki i Suki (2011) tumače: „Izgubili su koncentraciju tijekom aktivnosti m-učenja i završili na *chatu* i pretraživali zabavno-informativni sadržaj umjesto da uče." Osim toga, kôd *uvjerenje o postojanju nesklonosti prema stvaranju mobilnoga sadržaja* spomenuo je sudionik R6: 5 u studiji

Aisha i suradnika (2012): „*Ne vjerujem da će predavači uložiti vrijeme u pripremu dva paralelna predavanja od kojih jedno treba biti prezentabilno i jasno prema zahtjevima mobilnih aplikacija.*" Yang i Cornelius (2004) istraživali su percepcije sveučilišnih studenata o kvaliteti *online* obrazovanja i otkrili da je jedna od tema koja se pojavljuje loše oblikovan sadržaj kolegija. Ovaj rezultat je u skladu s uvjerenjem detektiranim i u našemu istraživanju, a koje se odnosi na nevoljkost stvaranja mobilnoga sadržaja. Naismith i Corlett (2006) utvrdili su pet kritičkih čimbenika uspjeha vezanih uz prilagodbu mobilnih tehnologija okolini učenja i poučavanja. Osim toga, koncept institucionalne podrške odnosi se na stvaranje povezanih sredstava u mobilnom formatu, obrazovni kadar i osiguravanje tehničke podrške. Razmatrajući te čimbenike uspjeha, otpor edukatora prema m-učenju može se objasniti nedostatnom institucionalnom podrškom. Osim toga, upotrebom metode metasinteze, Akay (2020) je ispitivao rezultate kvalitativnih istraživanja stavova i otpora prema tehnologiji aktivnih edukatora, pri čemu je otkrio da su uzroci otpora profesora nedostatno vrijeme, nedostatak pristupa računalnim programima, neprimjerena tehnička i administrativna podrška, uvjerenja i stavovi učitelja te teškoće u prilagođavanju tehnologije obrazovanom dizajnu. U vezi s tim uzrocima, neprimjerena tehnička i administrativna podrška i uvjerenje učitelja sukladni su rezultatima ovoga istraživanja.

Oslanjanje na obrazovanje licem u lice

Kodovi i veličine učinka frekvencije u kategoriji oslanjanje na formalno obrazovanje prikazani su u Tablici 12.

Tablica 12.

U skupini kodova u kategoriji *oslanjanje na obrazovanje licem u lice* kod *m-učenje ne može zamijeniti učenje licem-u-lice* ima najveći učinak frekvencije. Osim toga, nije bilo dostupnih podataka drugoga reda od autora primarnih studija o kodovima unutar ove kategorije. Kod *m-učenje ne može zamijeniti učenje licem u lice* spomenuo je sudionik R9: 7 u istraživanju Nalliveettila i Alenazija (2016): „*Pametni telefoni su korisni, ali kao studentu ti za učenje trebaju knjige.*" Nadalje, o kodu *preferiranje interakcije licem u lice* izrazio se sudionik R4: 5 iz Jamesove (2011) studije: „*Zašto moramo ovo raditi… ne znam…draže mi je neposredno slušati predavača.*" Slično tomu, kod *manjak suradnje* je spomenuo sudionik R8: 6 u istraživanju Kima i suradnika (2013): „*Jedna od loših strana je neučinkovitost suradnje.*" Naposljetku, kôd *neprimjerenost za složene teme* izrazio je sudionik u istraživanju Sukija i Sukija (2011): „*Sumnjam da mobilni uređaj može povećati moje znanje o teškom predmetu.*" Među prednostima m-učenja, kodovi *primjerenost za jednostavne sadržaje* u kategoriji obrazovnih prednosti i *neprimjerenost za složene sadržaje* u ovoj kategoriji u međusobnom su suglasju. Börner i suradnici (2012) istraživali su probleme s kojima se suočavaju stručnjaci u području m-učenja i zaključili da su to problemi regulacije učenja, suradnje i društvene interakcije. Iako razna istraživanja uvažavaju važnost mobilnih tehnologija i slogan „učenje bilo gdje i

bilo kada" koji se odnosi na m-učenje, mišljenja su kako je tradicionalno obrazovanje ugroženo (Pedro i sur., 2018). Iako studenti vole vježbati na osnovi svojih preferencija, ustvrdili su da m-učenje nije metoda sama po sebi, već dodatno sredstvo u njihovom formalnom obrazovanju (Teodorescu, 2015).

Zaključak

Korak 6. Promišljanje procesa. Nakon kvalitativne sinteze podataka u šest koraka raspravljalo se o razlozima sveučilišnih studenata za davanje ili nedavanje prednosti m-učenju. Osim toga, ovaj proces rasprave dimenzija je trećega reda izvedena iz sinteze istraživanja.

Ova metasinteza, koja je istraživala iskustva m-učenja sveučilišnih studenata, ispitivala je razloge studenata za preferenciju m-učenja, tj. razloge zbog kojih ne odabiru m-učenje nakon što su ga iskusili. U skladu s rezultatima dobivenima u procesu metasinteze, razlozi zbog kojih sveučilišni studenti preferiraju m-učenje klasificirani su u sljedeće kategorije: obrazovni razlozi, komunikacijski razlozi, olakšavanje života i uvjerenja. Unutar kategorije obrazovnih razloga učenje neovisno o vremenu i prostoru ističe se kao najčešći razlog preferencije m-učenja. M-učenje nudi jednake prilike učenja za sve studente zbog neovisnosti o prostornim i vremenskih ograničenjima (Ally i Prieto-Blázquez, 2014). U obrazovnim aktivnostima provedenima širom svijeta tijekom pandemije koju proživljavamo, čini se kako je najveća prednost m-učenja u odnosu na učenje licem u lice neovisnost učenja o vremenu i prostoru. Nakon koda učenje neovisno o vremenu i prostoru, mogućnost individualnoga učenja i širenje znanja bili su među najviše naglašenim razlozima za davanje prednosti m-učenju. M-učenje omogućuje pristup masovnim bazama podataka putem *online* i *offline* servisa te nudi prilagođeno iskustvo učenja učeniku i njegovim mogućnostima. U m-učenju studenti su individue koje konstantno mijenjaju svoje interese i potrebe, traže znanje na osnovi intrinzičnih potreba i reguliraju vlastito učenje (Yokuş, 2019). Ostali razlozi u skupini obrazovnih razloga za preferenciju m-učenja su korištenje obrazovnih aplikacija, ponavljanje, pojednostavljivanje sadržaja i primjerenost za jednostavne sadržaje. Osim toga, kategorija komunikacijskih razloga uključivala je prilike za učinkovitu komunikaciju i uspostavljanje platforme za *online* raspravu. Mobilni uređaju omogućuju studentima učenje putem podjele znanja i stručnosti, ispunjenja zadataka ili interakcije s drugim studentima tijekom suradnje na projektu (Ally i Prieto-Blázquez, 2014). Na taj način organizirane aktivnosti mogu se provoditi upotrebom tehnologija društvenih mreža i u *online* zajednicama, što naposljetku omogućuje aktivno sudjelovanje učenika u procesu učenja, tj. njihove interakcije u izmjeni i stvaranju smislenih informacija svojstvenih socijalnom konstruktivizmu (Vygotsky, 1978). U kategoriji olakšavanje života navedeni su sljedeći razlozi za davanje prednosti m-učenju: praktičnost, ušteda vremena, olakšavanje procesa učenja, planiranje i primjerenost našemu vremenu. Osim toga, pozitivni stavovi i motivacija navedeni su unutar kategorije uvjerenja, sa sličnom razinom naglaska. Mobilna tehnologija ne samo da informacije i obrazovne

resurse stavlja nadohvat ruke, već čini učenje interaktivnim, bogatijim i zabavnijim (Eschenbrenner i Nah, 2007).

Razlozi zbog kojih sveučilišni studenti ne daju prednost mobilnim tehnologijama u obrazovanju klasificirani su u kategorije tehničkih problema, ekonomskih problema, ergonomskih problema, uvjerenja i oslanjanja na formalno obrazovanje. U kategoriji tehničkih problema najviše naglašeni razlozi nedavanja prednosti m-učenju su: problemi s datotekama, spora internetska veza i loš signal te problemi s aplikacijama. Tehnička ograničenja nisu izravno povezana s m-učenjem, već s ograničenjima u upotrebi mobilnih uređaja (Bozkurt, 2015). Može se tvrditi kako će ograničenja obuhvaćena kategorijom tehničkih razloga nestati s kontinuiranim napretkom tehnologije. Prema podatcima iz 2018. godine, Alphabet, Microsoft, Samsung Electronics, Apple Inc. i Intel korporacije su među prvih 10 kompanija prema ulaganjima, tj. troškovima za inovacije. Ukupna investicija ovih pet kompanija je $68,5 bilijuna američkih dolara (https://www.strategyand.pwc.com/gx/en/insights/innovation1000.html#/tab2015|GlobalKeyFindingsTabs4, 2020). Iz ove perspektive, trenutačna i eventualna buduća ograničenja uzrokovana tehničkim problemima u aplikacijama m-učenja mogla bi se ukloniti ulaganjima u tehnologiju. Sigurnost osobnih podataka, neprimjerenost uređaja m-učenja, problemi s operativnim sustavima i niska rezolucija ostali su kodovi u kategoriji tehničkih problema. Otkrivena je zabrinutost korisnika zbog sigurnosti osobnih podataka povezana s tehnologijom čuvanja informacija u oblaku, koji omogućuje brzu, fleksibilnu i jeftinu pohranu i dijeljenje podataka bez vremenskih i prostornih ograničenja. Şengül i Bostan (2019) naveli su postojanje sigurnosnih problema prilikom rada u oblaku poput nepoznavanja i neuspjeha pri kontroliranju kompetencije davatelja usluga oblaka, nepoznavanja lokacije usluga i podataka, nepreuzimanje odgovornosti za sigurnost i integritet podataka i pristup pitanjima kontrole pružatelja usluge *oblaka*. U kategoriji ekonomskih problema skupoća mobilnih uređaja najistaknutiji je razlog zbog kojega sveučilišni studenti ne daju prednost m-učenju. Uz skupoću mobilne tehnologije, kao ostali razlozi nedavanja prednosti m-učenju u kategoriji ekonomskih problema su visoke cijene interneta i nedostatno primjereno sudjelovanje. Međunarodna telekomunikacijska unija kao najveću prepreku korištenju interneta u nerazvijenim zemljama navodi trošak i manjkave digitalne vještine korisnika (https://www.itu.int/en/mediacentre/Pages/2019-PR19.aspx, 2020). Ipak, također je prisutna tendencija smanjivanja ekonomskih ograničenja prilika m-učenja. Milijuni računala podijeljeni su studentima kao rezultat usvajanja zamisli *Jedan laptop po djetetu* (JLPD) u oko 50 razvijenih zemalja i zemalja u razvoju, bez profita. Ti projekti, započevši s pokusnim studijama 2007. godine, imali su za cilj ukloniti brojčanu nejednakost i povećati kvalitetu obrazovanja putem računala kupljenih po prihvatljivim cijenama (Doğan i sur., 2016). Slični projekti također se mogu implementirati sa sveučilišnim studentima. Kategorija ergonomskih problema uključuje male ekrane, male tipkovnice i probleme prilikom korištenja uređaja. Slično tomu, kategorija uvjerenja obuhvaća sljedeće razloge zbog kojih m-učenje nije favorizirano: negativan stav prema mobilnim

uređajima, uvjerenje da nije primjereno za učenje i da je gubitak vremena. Razlozi zbog kojih sveučilišni studenti ne doživljavaju mobilne tehnologije kao alate učenja i smatraju ih gubitkom vremena mogu se pronaći u činjenici da su te tehnologije uglavnom razvijene kao komunikacijski i mrežni alati te alati za fotografiranje i zabavu. Činjenica da sveučilišni studenti smatraju m-učenje gubitkom vremena može se pripisati konceptima akademskoga besposličarenja na internetu (*cyberloafinga*) (Knight, 2017) i kognitivne apsorpcije (Agarwal i Karahanna, 2000). Otpor edukatora prema tehnologiji, krivo razumijevanje upotrebe mobilne tehnologije i nevoljkost prema stvaranju mobilnoga sadržaja u kategoriji uvjerenja su ostali razlozi za nedavanje prednosti mobilnom učenju. Falowo (2007) je tvrdio da barijere obrazovanju na daljinu zasnovanom na aplikacijama na mreži mogu imati porijeklo u samim studentima, institucijama i članovima nastavničkoga kadra. Kategorija oslanjanja na obrazovanje licem u lice obuhvaća sljedeće razloge zbog koji se m-učenje ne favorizira: m-učenje ne može zamijeniti nastavu, preferiranje interakcije licem u lice, nemogućnost suradnje i neprimjerenost složenim temama.

U sklopu ovoga istraživanja u obliku metasinteze, koje je za cilj imalo ispitati iskustva m-učenja sveučilišnih studenata, utvrđene su kategorije i kodovi pri čemu su pokazane sličnosti i razlike između razloga za preferiranje i nepreferiranje m-učenja studenata u vezi njihovih sustava s istim. Na primjer, razlozi za preferenciju m-učenja uključuju pozitivan stav prema mobilnoj tehnologiji, uvjerenje da povećava motivaciju te uvjerenje da osigurava učinkovitu komunikaciju i štedi vrijeme. S druge strane, razlozi za nedavanje prednosti m-učenju uključuju negativan stav prema mobilnoj tehnologiji, uvjerenje da nije primjerena za učenje, ne omogućuje suradnju i predstavlja gubitak vremena. Očito je da postoje različita mišljenja, tj. razlozi zbog kojih sveučilišni studenti preferiraju upotrebu mobilnih tehnologija u obrazovanju ili ne. Iskustva m-učenja pokazuju sličnosti između razloga zbog kojih sveučilišni studenti biraju m-učenje ili im ne daju prednost: razlozi preferencije m-učenja uključuju njegovu primjerenost za jednostavan sadržaj, dok razlozi za nepreferiranje obuhvaćaju njegovu neprimjerenost složenim temama. S obzirom na navedeno, također postoje stavovi koji pokazuju sličnost između razloga zbog kojih sveučilišni studenti preferiraju mobilne tehnologije u obrazovanju ili ne.

Preporuke

Nije teško predvidjeti da će produkti tehnologije s vremenom imati sve veću ulogu u obrazovanju. Svjedoci smo promjena u obrazovanju, posebno tijekom pandemije koju proživljavamo te činjenice da mobilne tehnologije predstavljaju platforme za upotrebu aplikacija obrazovanja na daljinu. Iako su aplikacije m-učenja u prošlosti bile proizvoljne, sada predstavljaju esencijalnu potrebu. Zbog toga ovo istraživanje, u kojemu se pokušalo identificirati razlog zbog kojega sveučilišni studenti preferiraju m-učenje nakon što su ga iskusili, može doprinijeti poboljšanju kvalitete aplikacija m-učenja danas i u budućnosti. U tom kontekstu razvijene su preporuke za primjenu i istraživanje.

Preporuke za primjenu

1) Vlade mogu donijeti zakone koji bi osigurali osobne podatke korisnika mobilnih tehnologija u obrazovanju.
2) Obrazovani dizajn može se uskladiti s procesom m-učenja.
3) Organizacija programa profesionalnoga razvoja na osnovi Poznavanja tehnološko-pedagoškoga sadržaja (TPAC), kako bi se potaknula upotreba tehnologije edukatora u procesu obrazovanju.

Financijska podrška učenicima/studentima od strane vlade i međunarodnih organizacija radi omogućavanja pristupa mobilnim tehnologijama.

Preporuke za istraživače

1) Stavovi studenata prema m-učenju mogu se istraživati u kontekstu iskustva s m-učenjem koje je oslobođeno tehnoloških i ekonomskih ograničenja.
2) Istraživači ubuduće mogu provoditi metasažete studije o m-učenju.
3) Studija slučaja koja bi ponudila holističko viđenje opravdanosti upotrebe mobilnih tehnologija u nastavi.