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Öğretmen Eğitiminde Mobil Öğrenmenin Kullanımındaki Eğilimlerin Gözden Geçirilmesi

Yusuf Ziya OLPAK*[1], Hüseyin ATEŞ[2]

Anahtar Sözcükler

Mobil öğrenme
Öğretmen eğitimi
Sistematik inceleme
Bibliyometrik analiz

Makale Hakkında

Gönderim Tarihi
20 Şubat 2022
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Öz

Bu çalışma, öğretmen eğitiminde mobil öğrenmenin kullanımındaki son eğilimleri ortaya çıkarmayı amaçlamıştır. Bu kapsamda 11 Kasım 2020 tarihine kadar yayınlanmış olan ve bu araştırmanın kriterlerini karşılayan makaleler incelenmiştir. Sonuç olarak, SSCI'de indekslenen 58 makale için sistematik inceleme ve bibliyometrik analiz yapılmıştır. Araştırma sonuçlarına göre; 2016 yılı en çok çalışmanın yayınlandığı yıl olmakla beraber, incelenen araştırmalarda en çok kullanılan anahtar kelimenin "mobil öğrenme" ve özet bölümlerinde en çok kullanılan kelimenin ise "öğretmen" olduğu görülmüştür. Sonuçlar ayrıca en çok çalışmanın yapıldığı kıtanın Asya kıtası olduğunu ve ABD'nin en fazla çalışmanın yapıldığı ülke olduğunu göstermiştir. Ayrıca en çok kullanılan araştırma yöntemleri nicel araştırmalar iken, anket en çok tercih edilen veri toplama aracı olmuştur. En sık kullanılan örnekleme yöntemi, örneklem grubu ve örneklem büyüklüğü sırasıyla amaçlı örnekleme, öğretmenler ve 1-50 arasında katılımcıya sahip araştırmalardır. Ayrıca, araştırmanın diğer bulguları sunulmuş, tartışılmış ve önerilerde bulunulmuştur. Çalışma sonuçları; araştırmacılar, öğretmenler ve politika yapıcılar için öğretmen eğitiminde mobil öğrenmenin kullanımıyla ilgili araştırma eğilimleri hakkında farklı bir bakış açısı sunmaktadır.

Review of Trends in the Use of Mobile Learning in Teacher Education

Keywords

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Abstract

The present study purposed to examine recent trends in mobile learning in teacher education. In this context, articles were reviewed until November 11, 2020 that met the research criteria. As a result, systematic review and bibliometric analysis were conducted for 58 articles indexed in SSCI. According to the results of the study, 2016 was the year in which most studies were published. The results also showed that the continent with the most studies were Asia and the USA was the country where the most studies were carried out. In addition, quantitative articles were the most used research methods and a questionnaire was the most preferred data collection tool. The most commonly used sampling method, sampling group, and sampling size are purposive sampling, teachers, and 1-50, respectively. Other results of the study were presented and discussed and some suggestions were provided. The study results can gain insights for teachers, scholars, and policymakers into tendencies in the use of mobile learning in teacher education.

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*Sorumlu Yazar/Corresponding Author: yusufziyaolpak@gmail.com
[1] Phd, Kırşehir Ahi Evran University, Faculty of Education, Kırşehir, Turkey, yusufziyaolpak@gmail.com, https://orcid.org/ 0000-0001-5092-252X
[2] Phd, Kırşehir Ahi Evran University, Faculty of Education, Kırşehir, Turkey, huseyinates_38@hotmail.com, https://orcid.org/ 0000-0003-0031-8994

Introduction

Developments in information and communication technologies in recent years have been reflected in the field of education, as in all areas of life (Olpak & Ateş, 2018). Regarding the reflection of technology in the education environment, it was reported that more than two out of three of the global population live in districts covered by the mobile wideband network, and mobile technology services have become more affordable than before and this allows technology to be integrated into education (ITU, 2016). For instance, in the USA, in 2017, almost 20 million students studied in postsecondary institutions, and 6.6 million of them took various distance education/online learning courses including mobile learning (EducationData.org, 2020). Accordingly, in parallel with the popularity and accessibility of mobile learning facilities today, mobile learning is increasingly attracting the attention of researchers and educators since it provides collaboration between students, information seeking, and enhanced interaction and communication between student and teacher (Chee et al., 2017). The ubiquity, flexibility, and increasingly various competencies of mobile learning have sparked substantial interest in teachers who use the technology to improve their pedagogical practices (Kearney et al., 2015) and mobile learning has also been adopted as a substantial part of existing teacher education (Baydas & Yilmaz, 2018; Kearney & Maher, 2019). In general, mobile learning has the potential to improve teachers' professional learning by providing opportunities for them to analyze their practice and think collaboratively, as well as optimize their access to existing educational knowledge and experiences (Aubusson et al., 2009).

In order for individuals to have 21st-century competencies, it will be beneficial to include elements that support this in teacher education. In this context, considering that in-service and pre-service teachers will contribute to the training of individuals who can meet the needs of society in proportion to the quality of the education they receive, it is important that new technologies are used by this group. In this context, this study is important as it is tried to determine the trend of mobile learning in teacher education, whose usage area is increasing day by day. Considering this increase, earlier studies (e.g., Baran, 2014) provided important findings for researchers to comprehend the contribution of mobile devices in teacher education. However, there is a lack of systematic review of mobile learning in teacher education. To address the gap, the present research makes important contributions to the extant literature by providing an up-to-date review. The results of the study can help decide how to provide the necessary resources for using mobile learning in teacher education and plan to support further research and practice.

Mobile Learning

Up-to-date technologies have made mobile devices cheaper, more common, and useful (Sullivan et al., 2019; Wu et al., 2012). The advances led educators and scholars to a pedagogical perspective to develop educational apps for mobile technologies to contribute to learning and teaching, and studies conducted on mobile learning broadened considerably (Nikolopoulou et al., 2020; Wang et al., 2020). This expanding literature is interested in a variety of extensive research areas such as the efficacy and the development of mobile learning to help students' learning (Al-Emran et al., 2020). The developments in mobile technologies and educational uses of the technologies also led to changes in definitions of mobile learning (Pedro et al., 2018). Initial definitions were related to a simple relationship between mobile devices and the education process. For example, Quinn (2000) defined mobile learning as learning that happens using mobile devices. However, the scope of the

definition started to change in later times. Kynäslahti (2003) was interested in the immediacy and convenience of mobile learning, while Ozdamli and Cavus (2011) stated that mobile learning provides learning materials at any time and anywhere. Later on, Cheon et al. (2012) focused on the situative of mobile learning and stated that the learning process can occur in a real setting rather than the classroom environment. In addition, Kearney et al. (2012) emphasized the contextuality of mobile learning, Martin and Ertzberger (2013) stated authentic activities in the learning, and Hwang and Tsai (2011) were interested in motivational and attitudinal perspectives of mobile learning. In a recent definition, Yousafzai et al. (2016) defined mobile learning as "*the process of development, delivery, and consumption of learning material via a learning system subscriber using mobile devices*" (p. 785).

Based on these definitions, many researchers stated the benefits of mobile learning in education. Among them, some researchers stated that mobile learning allows learners to access the content of learning at different locations and times and to share the content of the learning process with other students (Crompton, 2017; Garcia-Cabot et al., 2015). Because mobile learning tools are portable and easily transportable, students can easily access, make changes and do modifications to learning contents (Derounian, 2020). There are potentially positive learning outcomes that can be involved in mobile devices, and technology can also strengthen students' motivation (Hartnett, 2016). Although mobile learning has many benefits, some challenges should be considered in the education and training environment (Al-Hunaiyyan et al., 2018). Among them, management and institutional challenges are about managing change within the educational institutions and this management can influence processes, activities, and individuals in the educational institutions including students, teachers, and school principals (Al-Sharhan, 2016). Design challenges express the problems experienced in the process of designing and developing a well-organized instructive interface in learning environments (Alhajri & AL-Hunaiyyan, 2016). Technological challenges of using mobile devices in education such as the small size of the smartphone screen, high cost of mobile phones, problems with device memory, and short battery life of smartphones have emerged (Criollo-C, Luján-Mora, & Jaramillo-Alcázar, 2018; Masters & Al-Rawahi, 2012; Sundgren, 2017). Evaluation challenges are considered important since evaluation strategies for education are generally managed in classroom environments in accordance with face-to-face mechanisms. Therefore, problems related to the effective use of mobile learning in education are encountered. In this context, Messinger (2011) stressed that there are some uncertainties and deficiencies about the role of mobile learning in the achievement of students and assess learning outcomes. Lastly, it can be stated that there are some cultural and social challenges such as problems with acceptance of mobile learning, difficulty in providing a student-centered learning environment, and problems encountered in the acceptance of mobile devices as educational material by students and teachers (Al-Hunaiyyan et al., 2018).

Mobile Learning in Teacher Education

As used in various fields of education, mobile learning has been preferred frequently in teacher education in recent years (e.g., Sungur Gül & Ateş, 2021; Sánchez-Prieto et al., 2017; Sánchez-Prieto et al., 2019). Therefore, there is an increase in the studies focusing on mobile learning in teacher education, and thus, scholars are interested in potential uses of mobile technology via communities of practice, study groups, and professional learning societies (e.g., Schuck et al., 2013). Using mobile technology in education can present various facilities for teachers (Evans, 2008; Kearney & Maher, 2019; Kim & Kim, 2017). These learning

environments strengthen individual and autonomous learning, learning by practicing, sharing, and peer assessment that can turn teaching into a more effective way (Wong, 2012). Furthermore, due to the benefits of mobile learning in teacher education, past studies clarified how to design materials and activities for the use of mobile devices in teaching (Ateş & Garzon, 2022; Chiu & Churchill, 2016; Martin & Ertzberger, 2013; Tondeur et al., 2017).

Previous Mobile Learning Reviews

Over the years, with the use of mobile devices in education, the extant literature has expanded and studies that reveal the trend are needed to guide other researchers. Therefore, recent studies have examined trends in mobile learning such as systematic review (e.g., Crompton & Burke, 2018; Krull & Duart, 2017), meta-analysis (e.g., Chee et al., 2017), text mining techniques (e.g., Hung & Zhang, 2012), content analysis (e.g., Chiang et al., 2016) and bibliometric analysis (e.g., Goksu, 2021).

Among them, some of these studies have reviewed the general characteristics of mobile learning. In a research carried out by Wu et al. (2012), 164 articles were reviewed from 2003 to 2010 to determine trends. Studies were classified into various categories such as research purposes, research methods, research outcomes, mobile learners by year, mobile devices by year, and highly cited articles. However, some of the other reviews focused on the specific education level of learners. For example, Crompton et al. (2017) reviewed 113 mobile learning studies conducted in PK-12 settings during 2010-2015 in terms of three parts. Firstly, study purposes, methods, and outcomes were reviewed. Secondly, subject matter domains, level of education, and context of education were investigated, and finally, geographic distributions of the studies, types of mobile devices, and learning theories were examined. Crompton and Burke (2018) reviewed the studies examining mobile learning use in higher education. They examined 148 studies during 2010–2016 in terms of "*purposes, outcomes, methodologies, subject matter domains, educational level, educational context, device types and geographical distribution of studies*" (p. 53).

However, to the best of our knowledge, Baran's (2014) study is the only research conducting a systematic review on mobile learning in teacher education. In this review, 37 studies were reviewed and published until 2014 to reveal trends and gaps found in the literature. In addition, studies were reviewed in terms of empirical studies, mobile applications used in teacher education, in-service teacher, pre-service teacher, and teacher educator participants; and studies published in peer-reviewed journals. However, the current study differs in some respects such as the purpose of the study, used keywords, and inclusion and exclusion criteria. In addition, the current study examined studies indexed in SSCI and presents an up-to-date review. Moreover, it was found that most of the studies examining mobile learning in teacher education were published after 2014. More precisely, the current study examined 58 studies, and 44 of the studies were published after 2014. From a careful review of the literature, it appears that there is a need for new review studies investigating the importance of mobile learning in teacher education due to reasons such as the fact that it has been a long time since the previous review studies. Further, the technologies used and the focus of the studies have changed. Accordingly, since there is no up-to-date systematic review focusing mainly on mobile learning in teacher education, this study will provide a robust understanding of how mobile learning is placed in the teacher education context.

Purpose of the Study

The present study purposed to examine recent trends in mobile learning in teacher education and provides qualitative and quantitative analysis of recent studies using systematic review and bibliometric analysis. The study examines the geographical distribution and research methodologies with a systematic review. In addition, a bibliometric analysis was carried out. In the direction of general purpose, there are six research questions. In studies including the use of mobile learning in teacher education;

- What is the geographical distribution?
- What are the research methodologies?
- Which keywords and words in the abstract are used frequently?
- What is the distribution of publication years and the number of authors?
- Who are the authors who published the most study?
- Which journals have the studies published the most?

Methodology

Research Design

The current research includes a systematic review and bibliometric analysis. A systematic review is "*the application of scientific strategies that limit bias to the systematic assembly, critical appraisal, and synthesis of all relevant studies on a specific topic.*" (Cook et al., 1995, p.167). It uses clear systematic methods chosen to minimize bias, so it provides reliable results from which inferences can be made (Antman et al., 1992). In the current study, a systematic review was carried out by considering the 27 PRISMA criteria (Liberati et al., 2009). The bibliometric analysis provides evaluating literature review by measuring certain indicators (Thelwall, 2008) and generates quantitative information by summarizing publications (Hung & Zhang, 2012). Bibliometric methods present quantitative perspectives are generally used to extract and process data based on citation analysis (Wallin, 2005), and computer-aided data processing techniques have been used from these methods (Ellegaard & Wallin, 2015). The analysis indicates some potential to initiate a reproducible, systematical and apparent knowledge presentation based upon statistical measurement of scientific activities (Diodato, 2013).

Article Selection Process

The articles used in the study were searched via the Web of Science (WOS). During the selection of articles, only studies written in English were preferred and the following search terms were reviewed in the titles, abstracts, and keywords of relevant studies without specifying any year range: 'mobile learning', 'mobile-learning', 'm-learning', 'mlearning', 'teacher', and 'teachers'. In the first search, a total of 156 articles were found, and these articles were downloaded as full text. The articles were reviewed with regard to their suitability for the purpose of the research. As a result, studies in different contexts that do not comply with the inclusion criteria presented in Table 1 were excluded by the researchers. Thus, as of November 11, 2020, it was identified that 58 articles were associated with the aim of the research as presented in Figure 1.

Table 1. Criteria of Selection

Inclusion	Exclusion
Mobile learning and teacher education are the primary content focus.	Teachers and K-12 students take part in the study together.
Articles are indexed in SSCI and written in English.	In applications for K-12 students in the classroom teachers' views and attitudes are taken.
Articles using specific keywords are included.	In the center of the education, the teacher is in the secondary.

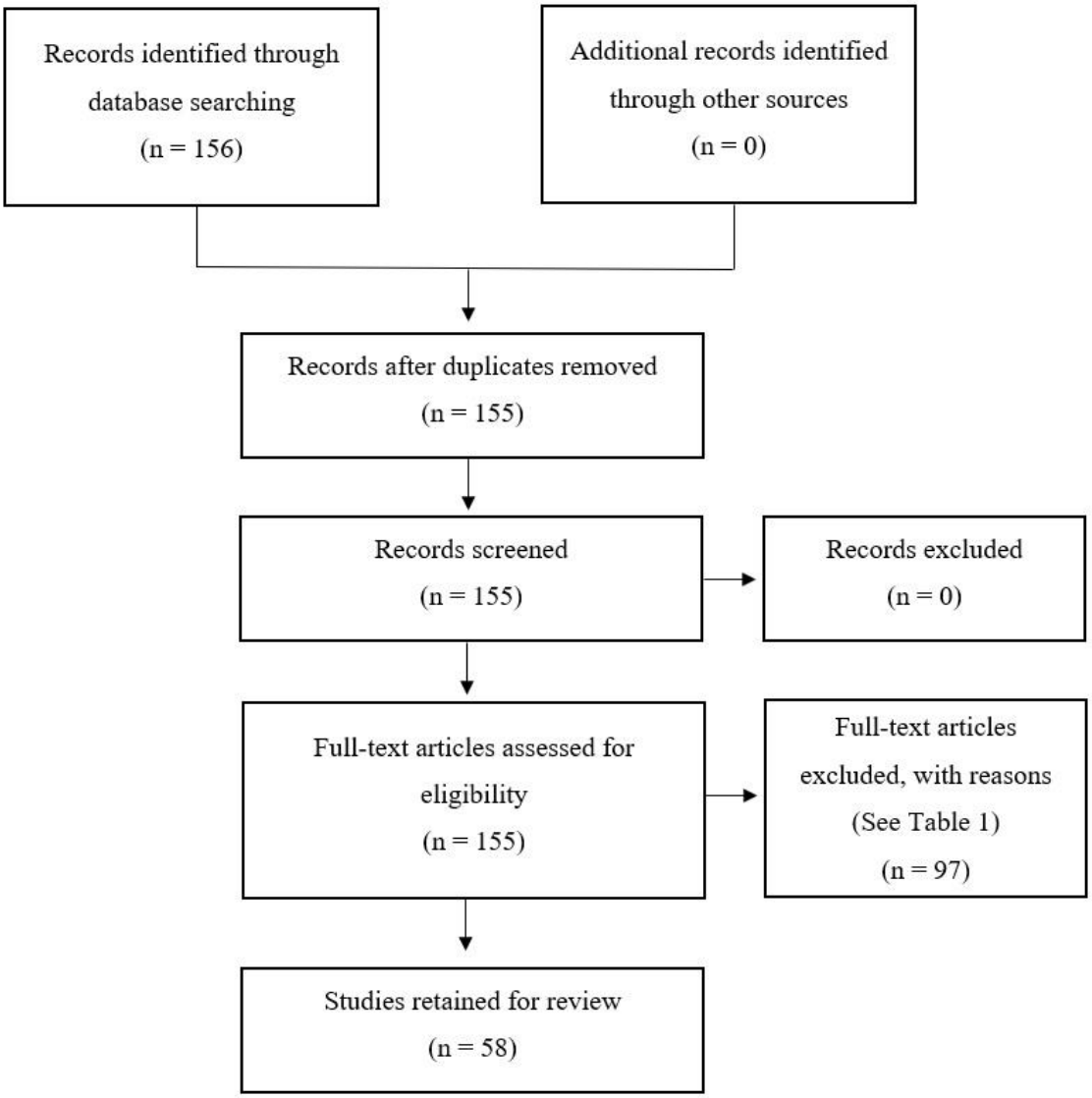

Figure 1. The Process toward Selection of Research

Data Coding and Analysis

In the current study, to conduct a content analysis of the articles, the publication classification form was used based on earlier research (e.g., Crompton & Burke, 2018; Göktaş et al., 2012) after some arrangements were made. The publication classification form includes countries of study, research design, research group, sample size, sampling method, data collection tool, data analysis method, the number of authors, and authors' country. Findings were presented through descriptive statistics. Finally, the VOSviewer software tool was utilized for the bibliometric analysis.

Results

Systematic Review Results

Geographical Distribution of the Studies.

When the geographical distribution of the articles was reviewed, it was found that the articles were published in six continents and 26 countries (See Figure 2). A great majority of studies were conducted in Asia (n=29) as a continent. Of the countries, the USA (n=10) was the country that studies were mostly conducted. Furthermore, some studies were conducted in more than one country and thus the total number of countries is higher than the number of reviewed studies.

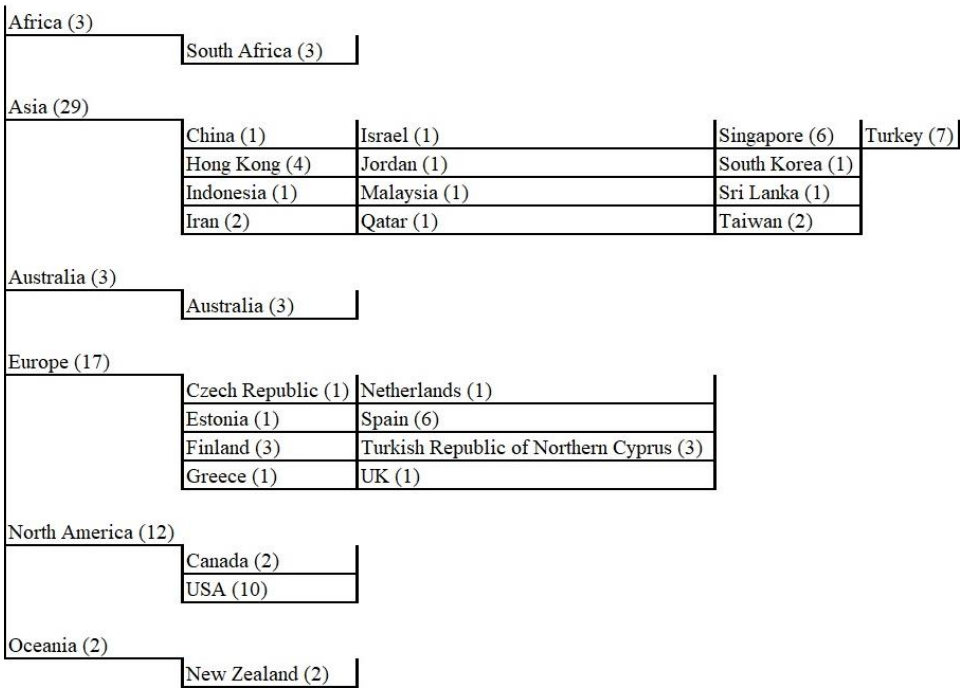

Figure 2. Geographical Distribution of the Studies

Research Design. As seen in Figure 3, most of the articles were conducted using quantitative research methods (n=24, 41.38%). In addition, under the other category included in Figure 3, (n=6, 10.34%), theoretical (n=3), literature review (n=1), model development (n=1), and design-based (n=1) studies are involved.

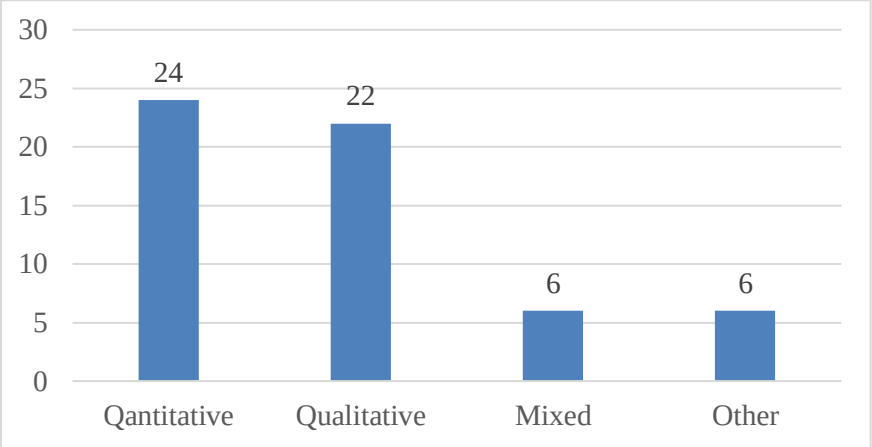

Figure 3. Research Methods Used in Reviewed Articles

Sampling Method, Sampling Group, and Sample Size. As shown in Figure 4, the most commonly used sampling method is purposive sampling (65%) followed by convenience sampling (24%). In addition, one study used stratified sampling. Furthermore, in some of the studies (9%), there was no participant or the sampling method was not specified. Teachers (55%) were the sampling group with the highest percentage of articles, followed by pre-service teachers (36%). However, some of the studies don't include any sampling group because they are theoretical studies (See Figure 5). Lastly, Figure 6 shows that in the majority of studies (36%), the number of participants was between 1 and 50. Studies conducted with 201 and more (21%) were next in frequency, followed by 101-200 (19%), and 51 and 100 (14%). However, 10% of the studies didn't identify or clearly state the sample size (e.g., 2-3 teachers for each group).

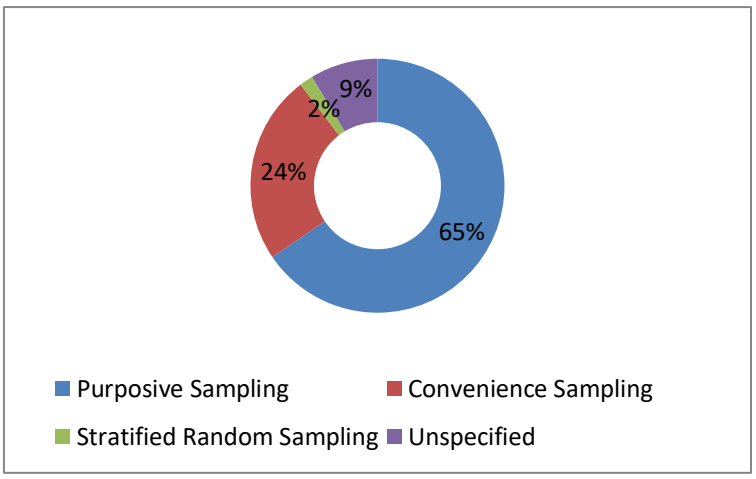

Figure 4. Sampling Methods Used in Reviewed Articles

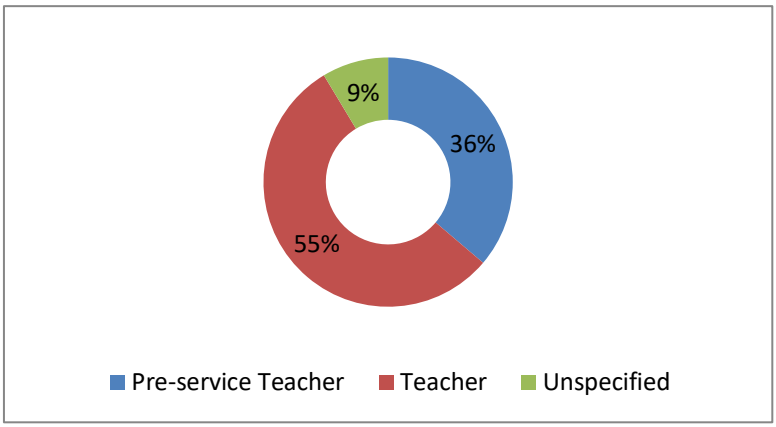

Figure 5. Sampling Group in Reviewed Articles

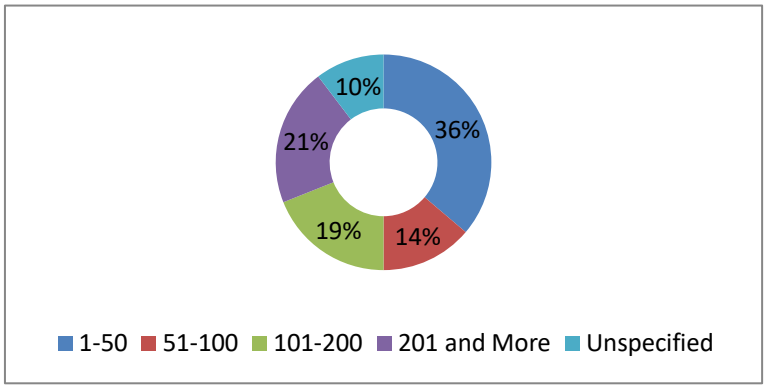

Figure 6. Sampling Size in Reviewed Articles

Data Collection Tool and Data Analysis. The distribution of the data collection tools is presented in Figure 7. The questionnaire (n=32) was the data collection tool most often used. An interview including focus group interviews and structured, semi-structured, and unstructured interviews was the next most commonly used (n=17) data collection tool. Observation (n=9) made via recording, video, and field notes and opinion form (n=9) were the third-most used data collection tool, followed by documents (n=3), alternative assessment tools (n=3), and achievement test (n=2), respectively.

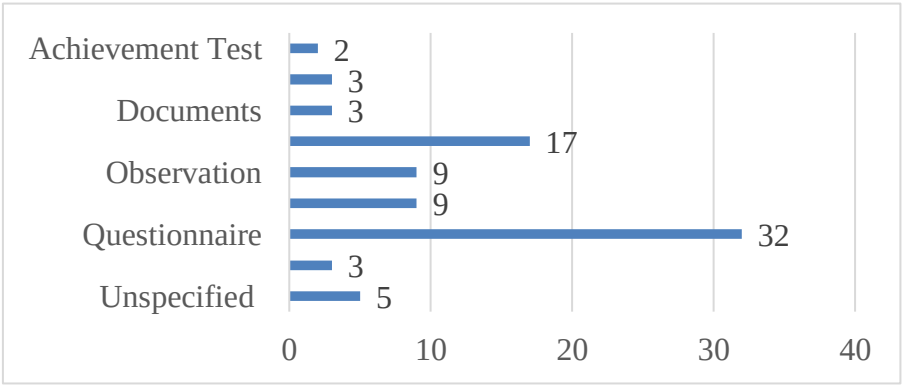

Figure 7. Data Collection Tools in Reviewed Articles

Figure 8 reveals that the most common analysis among studies was descriptive analysis (n=32). Content analysis (n=29) and inferential analysis (n=29) were the next highest number of studies. However, three studies didn't use any statistical analysis or it could not be determined which analysis method was preferred in the research. Among the descriptive statistics, means were the most preferred data analysis (33%). Standard deviation was the next highest with 28% of the studies, followed by frequencies (19%), percentages (17%), and graphs (3%). In addition, the most used inferential statistics was factor analysis (27%), followed by 18% of the studies with ANOVA. Table 2 demonstrated the distribution of data analysis methods in studies.

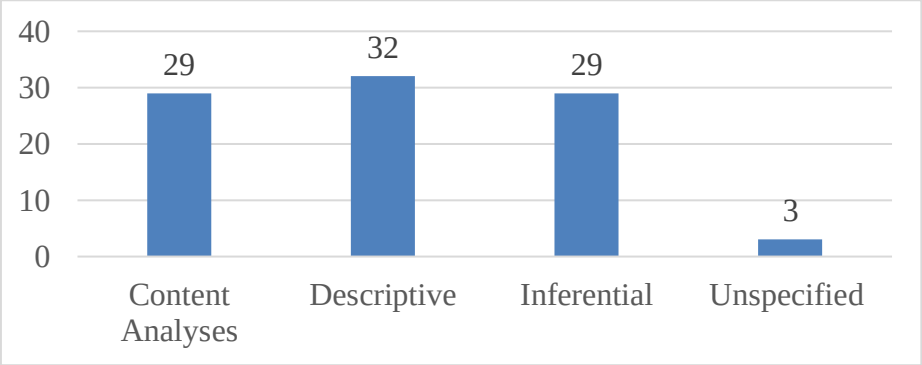

Figure 8. Data Analysis Methods in Reviewed Articles

Table 2. Distribution of Data Analysis Methods

Data Analysis Methods	Analyses	f	%
Descriptive Statistics	Means	28	32.56
	Standard Deviations	24	27.91
	Frequencies	16	18.60
	Percentages	15	17.44
	Graphs	3	3.49
Inferential Statistics	Factor Analysis	14	27.45
	ANOVA	9	17.65
	Path Analysis	7	13.73
	T-test	6	11.76
	Correlation	5	9.80
	Non-parametric Tests	5	9.80
	Regression	3	5.88
	ANCOVA	1	1.96
	MANOVA	1	1.96

Bibliometric Results

The Most Frequently Used Keywords. In 8 of the 58 studies, there were no keywords, so analyses in the current study were carried out in accordance with the data in the articles with keyword entries. In three different studies, index terms were used instead of keywords. As seen in Figure 9, there are four clusters and the most frequently used keywords are 'mobile learning' (f=30), 'teachers' (f=5), 'teacher education' (f=5), 'teacher professional development' (f=5), and 'technology integration' (f=4), respectively.

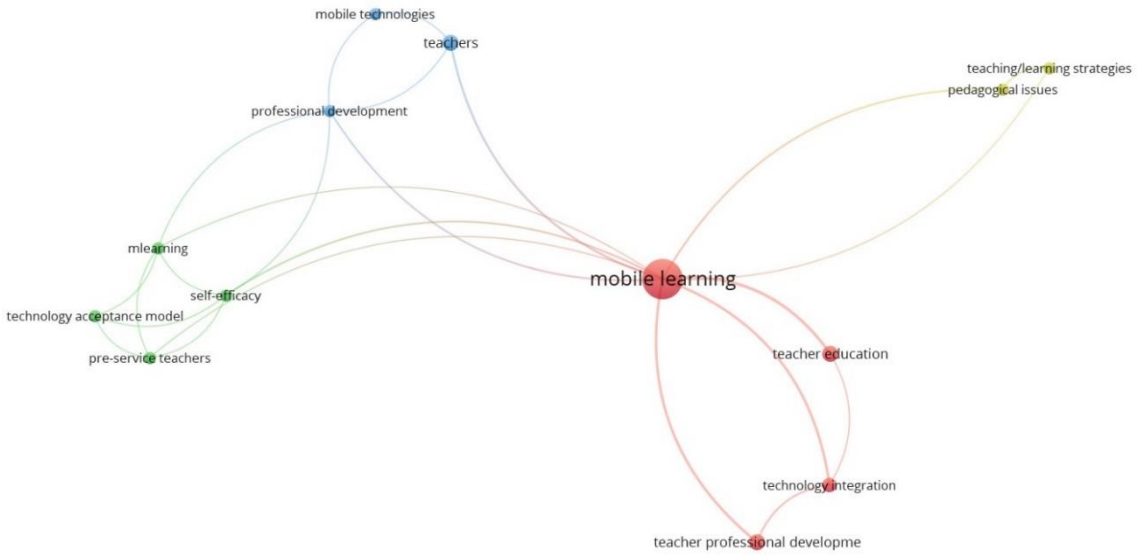

Figure 9. Frequently Used Keywords in the Studies

Frequently Included Words in Abstract. As presented in Figure 10, the findings indicated that there were two clusters, and the word 'teacher' was the most frequently included word in the abstract of the articles (f=52) followed by 'study' (f=46), 'learning' (f=33), 'mobile learning' (f=25) and 'student' (f=23).

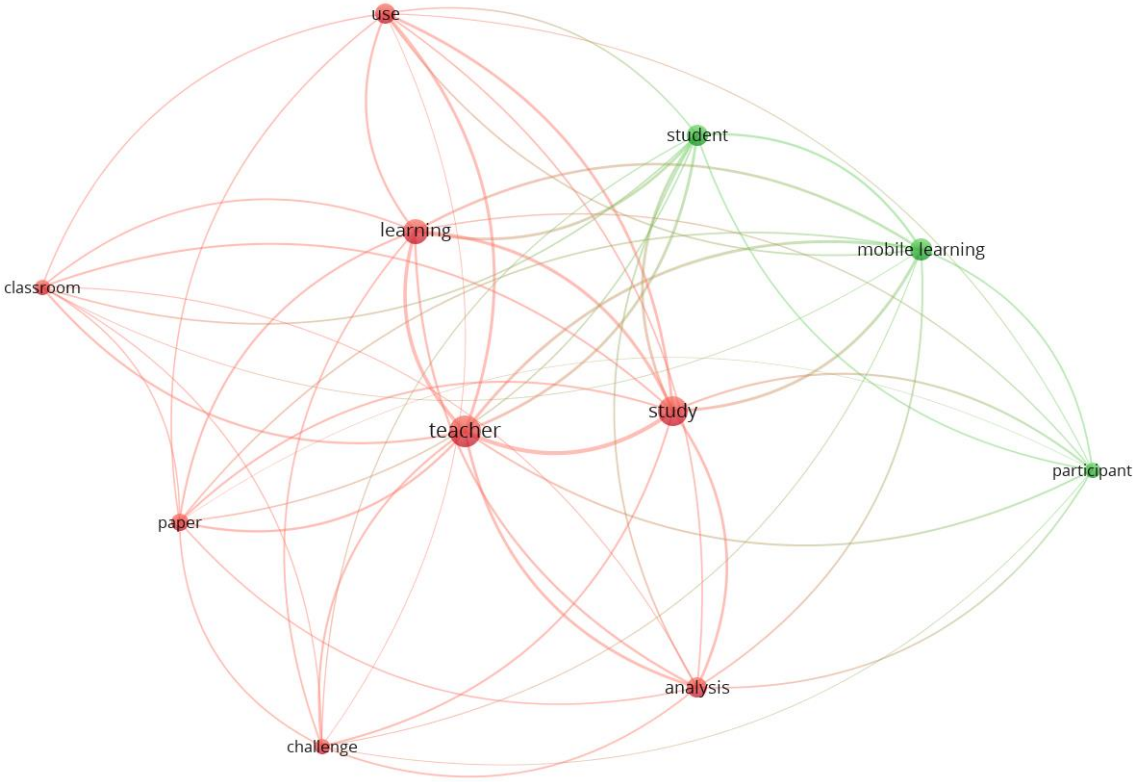

Figure 10. Frequently Included Words in Abstract

Authors. The distribution of articles with regards to publication years and number of authors showed that the first article was published in 2003 and that the article has been published continuously since 2011. Table 3 showed that, among 58 studies, the vast majority of articles were published in 2016 (n=13, 22.41%), while one article was published in each of 2003, 2008, 2011, and 2013.

Table 3. Number of Authors and Publication Years

Publication Year	Number of Authors						Total
	1	2	3	4	5	6	
2003		1					1
2008	1						1
2011		1					1
2012	2					1	3
2013			1				1
2014	2	2	1	2			7
2015		3	1	1	1		6
2016	3	7	2		1		13
2017		4	3				7
2018		2		2		1	5
2019		2	2		1		5
2020	1	2	2	3			8
Total	9	24	12	8	3	2	58

According to the findings of the most productive authors presented in Table 4, while Francisco J. García-Peñalvo, José Carlos Sánchez-Prieto and Susana Olmos-Migueláñez have the most articles with three articles each, Evrim Baran is the most cited author with 141 citations to 2 articles she published.

Table 4. List of Authors

Author	Number of Articles	Citation Numbers of the Articles (WOS)
Francisco J. García-Peñalvo	3	112
José Carlos Sánchez-Prieto	3	112
Susana Olmos-Migueláñez	3	112
Chee-Kit Looi	2	21
Chin-Chung Tsai	2	36
Daner Sun	2	21
Evrim Baran	2	141
Gerald Knezek	2	62
Matthew Kearney	2	59

Journals. Authors published 58 articles in 32 different sources, while only one study was published in 21 of them. As indicated in Table 5, the top three journals with the highest number of articles are 'British Journal of Educational Technology' (8 studies, 163 citations), 'Computers in Human Behavior' (6 studies, 244 citations), and 'Computers & Education' (4 studies, 135 citations).

Table 5. Journals with Multiple Articles

Journal	Number of Articles	Citation Numbers of the Articles (WOS)
British Journal of Educational Technology	8	163
Computers in Human Behavior	6	244
Computers & Education	4	135
Education and Information Technologies	3	1
Interactive Learning Environments	3	37
Journal of Computer Assisted Learning	3	161
Computer Assisted Language Learning	2	20
Eurasia Journal of Mathematics, Science and Technology Education	2	8
IEEE Transactions on Learning Technologies	2	30
South African Journal of Education	2	4
The Internet and Higher Education	2	133

Discussion

In this review, it was aimed to reveal research trends related to the use of mobile learning in teacher education. The reviewed studies were discussed with regards to geographical distribution and research methodologies through a systematic review. In addition, the most frequently used keywords and words in abstract, journals, publication years, and authors were analyzed using bibliometric analysis. This systematic review of the literature provides an overview of the studies that provide an understanding of the wideness, purpose, and scope of the researches related to mobile learning in teacher education.

The most publications about the topic in the last few decades were published in 2016. However, since the number of studies published in 2020 is limited to a certain date, for now, it does not reveal a clear result in terms of yearly comparison. However, considering the increases in the studies conducted in the previous years and the numbers in Table 3, it is predicted that this number is predicted to enhance even more at the end of the year. The increase was also reported by several researchers (e.g., Bano et al., 2018). This situation may be related to the increasing use of smart mobile devices in all areas of daily life (Tsinakos, 2013). It was also found that the great majority of articles was conducted in the Asia continent. Further, it was revealed that articles in the USA are conducted more than in other countries of the world. The results are consistent with previous systematic review reports (e.g., Chiang et al., 2016).

The results showed that quantitative studies were the most commonly used research design consistent with previous research (e.g., Chee et al., 2017). A vast majority of studies preferred in-service teachers more than pre-service teachers. Determining certain criteria in the selection of teachers and working with teachers who are more competent and more experienced in the field are frequently preferred by researchers in terms of contributing to teacher education in order to emphasize the place of mobile learning in teacher education. In addition, purposive sampling was mostly determined sampling method and the number of participants in the reviewed studies is low that is consistent with the study of Yıldız et al. (2020). This could be because of that teachers are not easy to reach samples like students. Since the number of students who can be reached in a study is higher than the number of teachers, it is more likely to choose convenience sampling in studies conducted with students. Supporting this finding, earlier review studies stated that studies on mobile learning use students more than teachers or adults (e.g., Burden et al., 2019).

Another finding obtained in the study is that most of them used questionnaires as data collection tools and descriptive analysis was preferred the most common analysis among studies. Similarly, Krull and Duart (2017) reported that the vast majority of mobile learning studies used questionnaires as data collection tools and descriptive analysis to perform statistical analysis. Moreover, means in descriptive statistics and factor analysis in inferential statistics were the majority of data analysis methods. The findings supported some of the previous researches (e.g., Yıldız et al., 2020). Furthermore, findings revealed that the most commonly used keywords were mobile learning, teachers, teacher education, technology integration, and teacher professional development, respectively. The findings emphasized the role of teachers' professional development through technology integration. Moreover, with the development of technology, it can be concluded that the use of mobile technology in teacher education has increased over the years. Among used words in the abstract, teacher was the most common preferred word. In addition, study, learning, mobile learning, and student are also among

the frequently used words implying that teachers are very important for mobile technologies to take place in the learning-teaching process. These findings are consistent with statements of earlier researchers who suggested that mobile technologies are suitable for the education process and have advantages with regards to cost and benefit (Goff et al., 2018). In the articles reviewed, it was found that Francisco J. García-Peñalvo, José Carlos Sánchez-Prieto and Susana Olmos-Migueláñez have the most articles, while Evrim Baran is the most cited author with 141 citations to 2 articles. Further, the findings in the reviewed studies showed the British Journal of Educational Technology, Computers in Human Behavior, and Computers & Education are frequently preferred journals. These results were in line with the impact factors of journals and rank and quartile reported by WOS.

Conclusion

This study, which provides an important point of view, is the first attempt to gain perspectives on mobile learning from many respects in teacher education including an up-to-date analysis, comprehensive aims and research questions, various data analysis methods, and unique results. This study performed both systematic analysis and bibliometric analysis to present recent studies.

In addition to the fact that this research makes important contributions to the literature, there are some limitations that future researchers should pay attention to. Since only 58 articles are eligible for inclusion in this study, it can be stated that the perspective on the effect of mobile learning on teacher education is limited. As more research is done on the contributions to be made to mobile learning on teacher education, much more important results will be obtained. Moreover, the study was reviewed English language articles indexed in SSCI. Therefore, an important part of studies which was published in other document types such as proceedings papers, books, technical reports, and thesis and other languages are not involved in the scope of this study. In the current study, some characteristics such as dependent and independent variables, the purpose of the study, study outcomes, and educational context were not analyzed. Future studies can address the last trends and gaps involved in the literature by taking into account these characteristics to integrate mobile technology into teacher education.

The study was conducted to better understand whether the use of mobile technology effectively benefits teacher education. However, more research is needed to broaden this body of knowledge. The results of this review have three gaps to be considered. Firstly, 79% of studies used quantitative or qualitative research designs. Secondly, most of the studies aimed to reveal teachers' beliefs, attitudes, perceptions, and anxieties with questionnaires and interviews. However, the effect of process-based activities in teacher education is not unknown. More mobile learning studies are needed developing teachers' personal development with experimental studies. This can lead to a deep understanding of the causality of mobile technology use and allow more generalization of study results (Crompton et al., 2016).

Geniş Özet

Giriş

Son yıllarda bilgi ve iletişim teknolojilerinde yaşanan gelişmelerin hayatın her alanında olduğu gibi eğitim alanına da yansımaları olmuştur (Olpak & Ateş, 2018). Teknolojinin eğitim ortamına yansımasıyla ilgili olarak, dünya nüfusunun üçte ikisinden fazlasının mobil uygulamaların kapsadığı yerleşim yerlerinde yaşadığı ve mobil teknoloji hizmetlerinin eskisine göre daha uygun hale geldiği ve bu sayede teknolojinin yaygınlaşmasına olanak sağladığı görülmektedir (ITU, 2016). Örneğin, 2017 yılında ABD'de yaklaşık 20 milyon öğrenci ortaöğretim sonrası kurumlarda eğitim görmüştür ve bunların 6,6 milyonu mobil öğrenme dahil çeşitli uzaktan eğitim/çevrimiçi öğrenme dersleri almıştır (EducationData.org, 2020). Buna göre, günümüzde mobil öğrenme olanaklarının popülaritesi ve erişilebilirliğine paralel olarak, mobil öğrenme, öğrenciler arasında işbirliğini, bilgi arayışını ve öğrenci ve öğretmen arasında gelişmiş etkileşim ve iletişimi sağladığı için araştırmacıların ve eğitimcilerin ilgisini giderek daha fazla çekmektedir (Chee ve diğerleri, 2017). Mobil öğrenmenin mekandan bağımsızlığı sağlayabilmesi, esnekliği ve giderek daha çeşitli yetkinlikleri ve teknolojiyi pedagojik uygulamalarını geliştirmek için kullanan öğretmenlerde de büyük ilgi uyandırmıştır (Kearney ve diğerleri, 2015) ve mobil öğrenme de mevcut öğretmen eğitiminin önemli bir parçası olarak benimsenmiştir (Baydaş ve Yılmaz, 2018; Kearney ve Maher, 2019). Genel olarak, mobil öğrenme, öğretmenlerin uygulamalarını analiz etmeleri ve işbirlikçi düşünmeleri için fırsatlar sunarak ve ayrıca mevcut eğitim bilgi ve deneyimlerine erişimlerini optimize ederek öğretmenlerin mesleki öğrenmelerini geliştirme potansiyeline de sahiptir (Aubusson ve diğerleri, 2009).

Bireylerin 21. yüzyıl yeterliliklerine sahip olmaları için öğretmen eğitiminde bunu destekleyen unsurlara yer verilmesi faydalı olacaktır. Bu bağlamda öğretmen adaylarının ve aldıkları eğitimin kalitesi ile orantılı olarak toplumun ihtiyaçlarına cevap verebilecek bireylerin yetişmesine katkı sağlayacağı düşünüldüğünde, yeni teknolojilerin bu kitle tarafından kullanılması önem arz etmektedir. Bu bağlamda, kullanım alanı her geçen gün artan öğretmen eğitiminde mobil öğrenme eğilimi belirlenmeye çalışıldığı için bu çalışma önemlidir. Bu artış göz önüne alındığında, daha önceki çalışmalar (Baran, 2014), araştırmacıların mobil cihazların öğretmen eğitimine katkısını daha iyi anlamaları için önemli katkılar sağlamıştır. Ancak, öğretmen eğitiminde mobil öğrenmenin sistematik olarak gözden geçirilmesine yönelik eksiklik vardır. Bu eksikliği gidermek için bu çalışma, sistematik inceleme ve bibliyometrik analiz kullanarak güncel bir inceleme sunarak mevcut literatüre katkıda bulunmaktadır. Çalışmanın sonuçları, öğretmen eğitiminde mobil öğrenmeyi kullanmak için gerekli kaynakların nasıl sağlanacağına karar vermede yardımcı olabilir ve daha fazla araştırma ve uygulamayı desteklemeyi sağlayabilir.

Bu araştırma, öğretmen eğitiminde mobil öğrenme eğilimlerini incelemeyi amaçlamaktadır ve sistematik inceleme ve bibliyometrik analiz kullanılarak son çalışmaların nitel ve nicel analizi yapılmıştır. Çalışma, coğrafi dağılım ve araştırma yöntemini (araştırma deseni, örnekleme yöntemi, örneklem grubu, örneklem büyüklüğü, veri toplama aracı ve veri analiz yöntemi) sistematik bir inceleme ile incelemektedir. Ayrıca bibliyometrik analiz ile, en çok kullanılan anahtar kelimeler, özet bölümlerinde en çok kullanılan kelimeler, yayın yılları, yazarlar ve dergiler açısından çalışmalara genel bir bakış sağlamayı amaçlamaktadır. Bu araştırmada aşağıdaki araştırma sorularına cevap aranmıştır.

- Öğretmen eğitiminde mobil öğrenmenin kullanımını içeren çalışmalarda;
- Coğrafi dağılım nasıldır?

- Araştırma yöntemlerine göre dağılımları nasıldır?
- En çok kullanılan anahtar kelimeler ve özet bölümünde en çok yer alan kelimeler hangileridir?
- Yayın yılı ve yazar sayısı dağılımı nasıldır?
- En çok çalışma yayınlayan yazarların dağılımı nasıldır?
- En çok çalışma yayınlayan dergilerin dağılımı nasıldır?

Yöntem

Bu çalışmada sistematik inceleme ve bibliyometrik analiz kullanılmıştır. Sistematik inceleme, belirli araştırma sorularını yanıtlamak için önceden belirlenmiş uygunluk kriterlerini karşılayan tüm ampirik kanıtları bir araya getirmeye çalışır (Liberati ve diğerleri, 2009). Mevcut çalışmada 27 PRISMA kriteri dikkate alınarak sistematik bir inceleme yapılmıştır (Liberati ve diğerleri , 2009). Bibliyometrik analiz ise belirli göstergeleri ölçerek literatür taramasının değerlendirilmesini sağlar (Thelwall, 2008) ve yayınları özetleyerek nicel bilgiler üretir (Hung & Zhang, 2012). Çalışmada kullanılan makaleler Web of Science (WOS) Core Collection veritabanının Gelişmiş Arama bölümünde taranmıştır. Tarama sonucunda 58 makale bu araştırma kapsamında kullanılmıştır. Araştırma kapsamında ulaşılan makalelere yönelik içerik analizi yapılabilmesi için ise "Yayın Sınıflama Formu" kullanılmıştır.

Bulgular

Makaleler altı kıtada 26 ülkede yapılmıştır. En fazla araştırma yapılan kıta Asya olup, bunu Avrupa, Kuzey Amerika Afrika, Avustralya ve Okyanusya takip etmektedir. Ayrıca ülkeler arasında en fazla araştırma yapılan ülke Amerika Birleşik Devletleri olurken, onu Türkiye, Singapur, İspanya ve Hong Kong izlemektedir. Mevcut çalışmada, araştırma yöntemleri nicel, nitel, karma ve diğer olmak üzere dört temel kategoride sınıflandırılmıştır: Nicel araştırma yöntemleri en yaygın araştırma yöntemi olmakla birlikte bunu nitel araştırmalar ve karma yöntemli araştırmalar izlemektedir. Araştırmalarda en yaygın olarak kullanılan örnekleme yöntemi amaçlı örnekleme yöntemidir. Sadece bir çalışmada tabakalı örnekleme kullanılmıştır. Bununla birlikte bazı araştırmalarda hangi örnekleme yönteminin kullanıldığına yönelik bilgi verilmemiştir. Yürütülen araştırmalar içerisinde en çok çalışılan örneklem grubu öğretmenler olmuş, bunu öğretmen adayları izlemiştir. Araştırmalarda veri toplama aracı olarak en çok ölçekler kullanılmıştır. Odak grup görüşmesi ile yapılandırılmış, yarı yapılandırılmış ve yapılandırılmamış görüşmeleri içeren bir görüşme, bir sonraki en yaygın kullanılan veri toplama aracı olmuştur. Kayıt, video ve alan notları yoluyla yapılan gözlem ve görüş formu en çok kullanılan üçüncü veri toplama aracı olmuş, bunu sırasıyla dokümanlar, alternatif değerlendirme araçları ve başarı testleri izlemiştir. Çalışmalar arasında en çok tercih edilen analiz yöntemi betimsel analiz olmuştur. Bu analizi sırasıyla içerik analizi ve çıkarımsal analiz takip etmiştir. Bibliyometrik analiz sonuçlarına göre en çok kullanılan anahtar kelimeler sırasıyla mobil öğrenme, öğretmen, öğretmen eğitimi, öğretmen mesleki gelişimi ve teknoloji entegrasyonu olmuştur. Araştırmaların özet bölümlerinde en çok kullanılan kelime öğretmen olurken, bunu çalışma, öğrenme, mobil öğrenme ve öğrenci takip etmiştir. İncelenen 58 makaleden 9'u tek yazarlı olmakla birlikte yayınlanan makalelerin çoğu iki yazarlı olarak hazırlanmıştır. Francisco J. García-Peñalvo, José Carlos Sánchez-Prieto ve Susana Olmos-Migueláñez üçer makale ile en fazla makaleye sahipken, Evrim Baran yayınladığı 2 makaleye 141 atıf ile en çok atıf alan yazardır. İncelenen 58 makale 32 farklı dergide yayımlanmıştır ve bunlardan 21'inde sadece bir makale yayınlanmıştır. En

fazla makaleye sahip ilk üç dergi British Journal of Educational Technology, Computers in Human Behavior ve Computers & Education olmuştur.

Tartışma ve Sonuç

Önemli bir bakış açısı sunan bu çalışmada, öğretmen eğitiminde mobil öğrenme kullanımına yönelik güncel bir analiz yapılmıştır. Bu araştırma kapsamlı amaç ve araştırma soruları, çeşitli veri analiz yöntemleri ve benzersiz sonuçlar dahil olmak üzere birçok açıdan mobil öğrenmeye ilişkin kapsamlı bir bakış açısı kazandırmıştır. Bu çalışma, en güncel çalışmaların sonuçlarından yararlanmak için hem sistematik inceleme hem de bibliyometrik analizden yararlanmıştır. Coğrafi dağılım ve araştırma metodolojileri ile ilgili çalışmaları gözden geçirmek için sistematik bir inceleme yapılmıştır. Bibliyometrik analiz, en çok kullanılan anahtar kelimelere, özet bölümlerinde en çok kullanılan kelimelere, yayın yıllarına, yazarlara ve dergilere ilişkin eğilimlere genel bir bakış sağlamıştır. Bu çalışma, güncel bir değerlendirme sunmuş ve araştırmacıların öğretmen eğitiminde mobil öğrenmenin önemine dair bütünsel bir anlayış kazanmaları ve literatürdeki araştırma boşluklarını anlamaları için faydalı sonuçlar göstermiştir.

Bu araştırmanın literatüre önemli katkılar sağlamasının yanı sıra gelecekteki araştırmacıların dikkat etmesi gereken bazı sınırlılıklar da bulunmaktadır. Araştırma kapsamında 58 makale bu çalışmaya dahil edilmeye uygun olduğundan, mobil öğrenmenin öğretmen eğitimine etkisine ilişkin bakış açısının sınırlı olduğu ifade edilebilir. Öğretmen eğitiminde mobil öğrenmeye yapılacak katkılar konusunda daha fazla araştırma yapıldıkça çok daha önemli sonuçlar elde edilecektir. Ayrıca, çalışma kapsamında SSCI kapsamında taranan dergilerdeki İngilizce makaleler incelenmiştir. Bu nedenle bildiriler, kitaplar, teknik raporlar ve tezler gibi diğer belge türlerinde ve diğer dillerde yayınlanan çalışmalar bu çalışmanın kapsamı dışındadır. Mevcut çalışmada, bağımlı ve bağımsız değişkenler, çalışmanın amacı, çalışma sonuçları ve eğitim bağlamı gibi bazı değişkenler analiz edilmemiştir. Gelecekteki çalışmalar, mobil öğrenmeyi öğretmen eğitimine entegre etmek için bu değişkenleri de dikkate alarak alanyazındaki son eğilimleri ve boşlukları ele alabilir. Bununla birlikte, bu bilgi birikimini genişletmek için daha fazla araştırmaya ihtiyaç vardır.

Bu araştırmanın sonuçları dikkate alınması gereken bazı boşluklar içermektedir. İlk olarak, çalışmaların %79'u nicel veya nitel araştırma tasarımları kullanmıştır. Karma yöntemli araştırmalar büyük ve karmaşık araştırma sorularını yanıtlamak için uygun olduğundan, yalnızca bir yöntemin kullanıldığı bir çalışmada gözden kaçabilecek farklı görüş ve anlayışları ortaya çıkarmak için gelecekteki araştırmalar karma yöntem araştırma tasarımına odaklanabilirler (Johnson & Onwuegbuzie, 2004). İkinci olarak, araştırmaların çoğu öğretmenlerin inançlarını, tutumlarını, algılarını ve kaygılarını ölçek ve görüşmelerle ortaya çıkarmayı amaçlamıştır. Ancak süreç temelli etkinliklerin öğretmen eğitimindeki etkisi bilinmemektedir. Öğretmenlerin kişisel gelişimlerini deneysel çalışmalarla geliştiren daha fazla mobil öğrenme çalışmasına ihtiyaç vardır. Bu, mobil teknoloji kullanımının nedenselliğinin derinlemesine anlaşılmasını sağlayabilir ve çalışma sonuçlarının daha genelleştirilmesine izin verebilir (Crompton ve diğerleri, 2016). Son olarak yapılan çalışmalarda ABD ve Türkiye gibi bazı ülkelerde önemli sayıda çalışmanın yapıldığı ortaya çıkmıştır. Mobil öğrenme ile ilgili daha derin kavrayışlar sunabileceğinden, öğretmen eğitimi üzerinde etkisi olabilecek farklı değişkenleri (Örneğin, ders tasarımı, öğretmen özellikleri ve davranışı ve öğretim yaklaşımı) dikkate alarak farklı kültürleri içeren planlamalar yapılması gelecekteki çalışmalar için faydalı olabilir.

Yayın Etiği Bildirimi / Research Ethics

Araştırma ve yayın etiği konusunda bilimsel etik kaideler göz önünde bulundurulmuştur. / Scientific ethical principles have been taken into consideration in research and publication ethics.

Araştırmacıların Katkı Oranı / Contribution Rate of Researchers

Birinci araştırmacı makalenin genelinde ana sorumlu yazar olarak çalışmada yer alırken ikinci araştırmacı giriş, yöntem, veri analizi, tartışma ve sonuç bölümlerinde katkı sağlamıştır. / While the first researcher took part in the study as the main responsible author throughout the article, the second researcher contributed in the introduction, method, data analysis, discussion and conclusion sections.

Çıkar Çatışması / Conflict of Interest

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Etik Kurul Onayı / The Ethical Commitee Approval

Bu araştırma makalesinin etik sorunu olmadığını beyan ederiz. / We hereby declare that this research article does not have an unethical problem.

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