

Research Trends in Mobile Learning: A Systematic Literature Review From 2011-2021

Siti Aisyah¹ , Afrizal Afrizal² 

¹State Senior High School 92 Jakarta, Jakarta 14130, Indonesia

²Department of Chemistry Education, Universitas Negeri Jakarta, Indonesia



This is an open access article under the Creative Commons Attribution 4.0 International License.

*Correspondence

Siti Aisyah
sitiaisyahmignon2018@gmail.com

Received:

16 June 2022

Accepted:

23 August 2022

Published:

30 September 2022

Citation: Aisyah, S., & Afrizal, A. (2022). Research Trends in Mobile Learning: A Systematic Literature Review from 2011-2021. *Journal of Educational Technology and Instruction*, 1(1), 49-61.

Abstract—As of late, coordinating innovation into schooling keeps on standing out alongside the fast development of information and communication technology. In the writing survey, mobile learning is a learning idea that underscores the learning system with cell phones without relying upon the actual area of learning. This review means to give an exhaustive perspective on the past writing and some potential headings for scientists and instructors for additional mobile learning research. A sum of 45 papers was chosen from the ERIC database. Utilization of the term mobile learning in the title, research strategies, number of authors, major contributing nations, most useful diaries, and cell phones utilized in portable learning are investigated. The outcomes show that exploration of mobile learning has kept on getting consideration from specialists somewhat recently. Among the distributions explored, every one of the 40 articles contained the term mobile learning in the title and dynamic. As of recently, quantitative techniques are more regularly taken on in mobile learning research than quantitative strategies, blended techniques, and research and development (RnD) strategies. When arranged by country, Turkey has the most elevated commitment contrasted with different nations in this field, followed by Indonesia, South Africa, Malaysia, Thailand, China, and Spain. The greater part of the papers distributed in mobile learning research has four authors. In light of the number of articles distributed in mobile learning, *Canadian Center of Science and Education*, *South African Journal of Education*, and *International Journal of Education and Development* utilizing information and communication turned into the most useful diaries in this exploration. The most generally involved cellular phones in this review are cellular phones and tablets.

Keywords: Literature review, research trends, systematic analysis, mobile learning

1. INTRODUCTION

The advancement of our schooling framework is significantly affected by current mechanical turns of events. The advancement of innovation is so quick and has caused changes in parts of human existence, including how people learn (Henrie et al., 2015). In this manner, the execution of learning in the homeroom should be adjusted to current necessities so that understudies' advantage in learning can increment. Innovation-based learning at essential and optional levels can be considered as another learning technique. The utilization of electronic gadgets, for example, cells, tablets, workstations, and cell phones have changed the manner in which individuals learn. Understudies can deal with notes, schoolwork, and tasks given by the instructor utilizing cell phones, which brings about expanded adapting anyplace and whenever (Norhayati & Yusoff, 2015). This strategy is known as mobile learning. Versatile Learning is another technique for learning and the consequence of creating electronic-based learning (Hockly, 2013).

Mobile learning (or *m-learning*) is characterized as remote, computerized, and mechanical gadgets, by and large, created for people in general, utilized by a student for taking part in instruction (Traxler, 2007). mobile learning is an instrument that vision of

things to come that can uphold learning in manners that recently was unrealistic and increment the utilization of innovation in instruction (Traxler and Vosloo, 2014). Learning rehearses utilize versatile innovation straightforwardly or just supplement learning with data innovation and correspondence (ICT), to permit the learning system to happen whenever and anyplace (Volsoo, 2015).

Versatile learning can possibly show up in our schooling framework on the grounds that each individual is fit for possessing a cell phone (Nawi & Hamzah, 2013). As indicated by Twum (2017), remote innovation and cell innovation are furnished with mixed media includes that empower the execution of mobile learning inside and outside the homeroom. mobile learning is a learning idea that underlines the learning system without relying upon the actual area of learning (Traxler & Kukulka, 2016). Furthermore, this strategy gives different options that can be utilized to work with connections including distance. The job of cell phones as an instrument for sending and getting email, short message administrations, sight and sound informing administrations, web perusing, and different other PC applications have expanded the convenience of these mechanical devices (Liu et al., 2010). The advantage of mobile learning being presented in the field of instruction is to expand understudies' inspiration in science and learn something inside and out (Muslimin et al., 2017).

The advantages of mobile learning According to Efendi and Zhuang (2005) include the following:

- a) Cost-effective because it can reduce costs for conventional technical matters, such as providing whiteboard equipment, consumption for teachers, projectors, and others.
- b) The flexibility of time and place. mobile learning can make users adjust the time and place of learning. They can insert learning in their spare time and in different places.
- c) Teaching standardization. The existence of differences in the ability to provide teaching by teachers or instructors causes participants to have differences in absorbing learning, sometimes teaching standards also depend on the mood of the teacher. mobile learning can erase these differences, lessons in mobile learning have the same quality every time they are accessed and do not depend on the mood of the teacher.
- d) The flexibility of learning speed. Each student has a different ability to absorb lessons, some are fast and some are slow. This can be overcome by mobile learning because the speed of learning depends on each student.

Writing studies on mobile learning have been distributed lately. For instance, Hung and Zhang (2012) directed a review on mobile learning concentrating on research patterns from 2003 to 2008. Text mining strategies were utilized to give essential bibliometric insights, theme recurrence patterns, point strength by nation, and inclination for every subject by diary. The analyst saw that as (1) mobile learning articles expanded to eight out of 2003 to 36 out of 2008; (2) viability, assessment, and customized frameworks are the most well-known fields of study; and (3) Taiwan directed the most versatile learning studies. Hwang and Tsai (2011) led an examination study on patterns in mobile learning from 2001 to 2010 with 117 articles. They observed the number of articles distributed from 2005 to 2010 almost quadrupled from 2001 to 2005. The example bunches are chosen to concentrate on rank as follows: advanced education (59), primary school understudies (41), and secondary school understudies (17). A couple of concentrated on chosen educators (6) and working grown-ups (6) as the exploration test. Their examination saw that as the vast majority of the exploration directed didn't include any learning space, rather, they were primarily centered around researching understudies' inspirations, discernments, and perspectives towards versatile learning. Contributing nation number 23 with Taiwan having the largest number of

distributions (51). Liu et al. (2014) analyzed examinations on mobile learning from 2007 to 2016. They tracked down 63 articles from 15 diaries. The consequences of this review are fundamentally exploratory in nature and spotlight on understanding instructive reasonableness involving cell phones in informative practice. A review of 114 papers from mobile learning 2005, 2007, and 2008 was led by Wingkvist and Ericsson (2011). The aftereffect of this exploration is mobile learning research is developing quickly from one year to another. Zakaria et al. (2019) broke down 66 articles on mobile learning research from 2010 to 2018. This article broke down which included full-text articles and companion investigated diary articles from Google Scholar and ERIC to analyze the two sources. The consequences of this review demonstrate that quantitative is the most generally involved strategy in investigating clients' points of view and impression of M-learning and mobile learning in proper training.

In view of the past research above, it would appear there is something that has not been explored by past investigations, specifically the writing survey on the recurrence of involving the term mobile learning in the title, the most useful diary/adding to mobile learning research. Consequently, specialists are keen on analysts of these factors in this review. Data about research patterns and potential bearings in mobile learning can help specialists and instructors comprehend the advancement of exploration around here and afterward plan for future examinations. Subsequently, the flow concentrates on expects to dissect the momentum status and give wide information on mobile learning research between 2011 and mid-2021. For this reason, diary articles distributed by ERIC were distinguished. Ideally, the ebb and flow research give an extensive and precise view around here to help instructors and teachers all over the planet in leading examination identified with mobile learning and distributing their papers later on. To this end, the exploration questions brought up in this review are:

1. How is the example of archive distribution with and without mobile learning remembered for the title over the most recent 11 years?
2. How have the examination strategies for papers distributed in scholarly diaries fluctuated from 2011-2021?
3. How is the dispersion of inspected articles dependent on the number of authors for the period 2011-2021?
4. Which nations distribute the most distributions in different scholarly diaries from 2011-2021?
5. What scholarly diaries distribute more papers identified with mobile learning in the 2011-2021 period?
6. What kinds of cell phones are utilized the most in mobile learning research in the 2011-2021 period?

2. METHODS

2.1 Research Design

This research uses a literature review method. A literature review is a research methodology that aims to collect and extract the essence of previous research and analyze several overviews of experts written in the text (Snyder, 2019). Researchers searched for all journal papers on mobile learning from the Education Resources Information Center (ERIC) database (<https://eric.ed.gov/>) for the period 2011-2021. Document search was conducted on October 8, 2021.

2.2 Inclusion Criteria

In this study, specific criteria were set to enter the required documents. For example, papers must be written in English, and research journal articles published in the period

2011 to 2021. The perspective for the use of the term mobile learning in the title, research method, number of authors, main contributing countries, most productive journals/contributing to mobile learning research, mobile devices used in mobile learning for further analysis.

2.3 Data Analysis

The terms utilized in the quest for the example papers are “mobile learning”, “M-Learning” or “Mlearning” to track down related articles. The outcomes got 757 articles. Articles that can be accessed from 2011 to 2021 are 156 documents. All together with the end goal of the paper to be as per the exploration targets, the analyst recognized the title, theoretical, and catchphrases of the article physically. The scientist then, at that point, peruses each paper and twofold actually looks at all archives to guarantee that the objective paper meets the measures and that there are no duplications. In the wake of checking, 47 articles were remembered for non-diaries and 39 articles were not written in English, so the excess 70 articles. To choose the final articles, the analyst initially inspects the title, then, at that point, the theoretical lastly read at the full text.

In the selection process, the authors read the full text of all papers. After filtering the data, there were 15 articles that didn't approach the full text, bringing about 55 articles. To be more exact, the analyst examines whether the primary theme is as per the consideration rules, assuming there is any uncertainty about the paper, then, at that point, the paper is assessed. Subsequently, there were 45 papers that met the incorporation measures and were chosen for analysis. All last examples were distinguished, including the number of authors, name of diary, the nation of the author, and examination technique. In this study, the PRISMA flow diagram of the systematic review is shown in Figure 1.

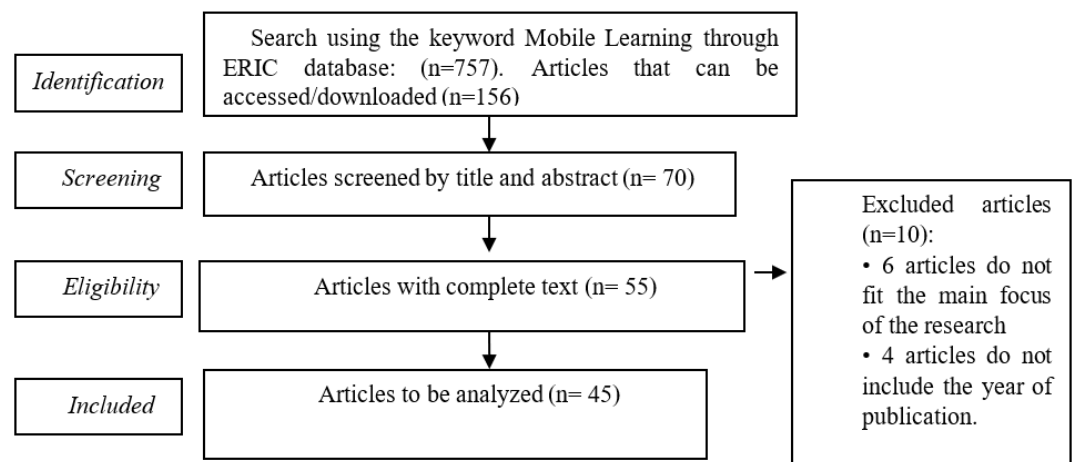


Figure 1. PRISMA flow diagram of literature review

3. RESULTS

Specifically, this section presents the results of the analysis of selected papers from the ERIC database over the 2011–2021 timeframe. The results are presented in six sections, namely the use of the term mobile learning in the title, research methods, number of authors, major contributing countries, the most productive journals/contributing to mobile learning research, and mobile devices used in mobile learning.

3.1 Frequency of the Term “Mobile Learning” Used in the Title

Figure 2 explains the use of the term mobile learning in the title of the article for 2011-2021.

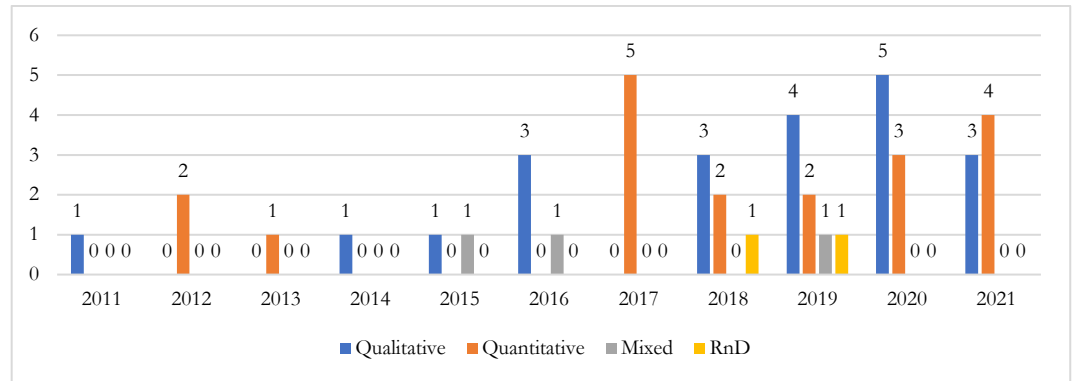


Figure 3. Distribution of research methods used in mobile learning research

Distribution The number of articles with and without the term mobile learning in the title fluctuated from 2011 to 2021. A total of 40 articles had the term mobile learning in the title while 5 articles did not contain the term mobile learning in the title. The highest number of articles that have the term mobile learning in the title is 2019. While the highest number of articles without the term mobile learning in the title is 2020. So the use of the term mobile learning in the title is growing rapidly from year to year.

3.2 Distribution of Research Methods

Figure 3 illustrates the frequency of research methods from mobile learning research during the years 2011-2021.

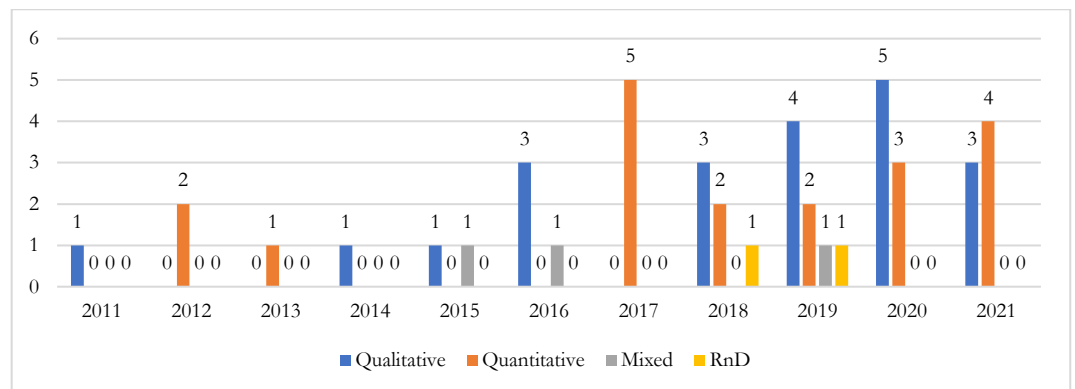


Figure 3. Distribution of research methods used in mobile learning research

According to Figure 3, quantitative methods dominate mobile learning research. Qualitative methods are also used consistently. In terms of publications, qualitative methods are popular among mobile learning researchers in 2020 while quantitative methods are popular in 2017. In general, the frequency of research methods analyzed is from 2011-2021, quantitative methods (n=21) have the highest rank, qualitative methods (n=19), mix method (n=3), and research and development (n=2).

3.3 Most Productive Countries in Mobile Learning Research

Table 1 presents 23 countries by the number of articles published in mobile learning research.

Table 1. Number of publications by country

Country	N	%
Turkey	6	26.08
Indonesia	5	21.74
south Africa	4	17.39
Malaysia	4	17.39
Thailand	3	13.04
China	3	13.04
Spanish	3	13.04
Saudi Arabia	2	8.69
Caribbean	1	4.34
Zimbabwe	1	4.34
Australia	1	4.34
Czech	1	4.34
Oman	1	4.34
USA	1	4.34
UAE	1	4.34
India	1	4.34
Pakistan	1	4.34
Canada	1	4.34
Jordan	1	4.34
Sri Lanka	1	4.34
Finland	1	4.34
Nepal	1	4.34
Nigeria	1	4.34

Based on the table above, it can be seen that Turkey (26.08%) has the highest contribution compared to other countries in mobile learning research, followed by Indonesia (21.74%), South Africa and Malaysia (17.39%), Thailand, China, Spain (13.04 %). From table 1 it can be seen, as many as 15 countries only have 1 paper.

3.4 Number of Publications by Journal

Table 2 provides 33 journals that published articles on mobile learning research from 2011-2021.

Table 2. Number of Publications by Journal

Journal	N
Canadian Center of Science and Education	3
South African Journal of Education	3
International Journal of Education and Development using Information and Communication Technology	3
Malaysian Online Journal of Educational Technology	2
International Review of Research in Open and Distributed Learning	2
Turkish Online Journal of Distance Education	2
Knowledge Management & E-Learning	2
Journal of Educational Technology & Online Learning	2
Education Sciences	2

Journal	N
International Education Studies	1
The Electronic Journal of e-Learning	1
TOJET: The Turkish Online Journal of Educational Technology	1
International Conference mobile learning	1
International Council for Open and Distance Education	1
International Journal Of Environmental & Science Education	1
Frontline Learning Research	1
Contemporary Educational Technology	1
14th International Conference on Cognition and Exploratory Learning in Digital Age	1
International Journal of Instruction	1
Educational Research and Reviews	1
Pakistan Journal of Distance & Online Learning	1
Journal of Education and e-Learning Research	1
Journal of New Approaches in Educational Research	1
Journal of Pedagogical Research	1
International Electronic Journal Of Mathematics Education	1
The Eurocall Review	1
Asian Journal of Distance Education	1
Problems of education in the 21st century	1
Papers in Education: Current Research and Practice	1
International Journal of Education and Practice	1
Journal of Educational Technology & Online Learning	1
Education Process International Journal	1
Learn Journal: Language Education and Acquisition Research Network	1

Based on the number of articles published in mobile learning, the Canadian Center of Science and Education, South African Journal of Education, and International Journal of Education and Development using Information and Communication Technology became the most productive journals in this research, with 3 papers each. A total of 6 journals published 2 papers, and the rest published 1 paper.

3.5 Number of Authors in Mobile Learning Research

Figure 4 shows the number of authors in mobile learning research articles from 2011-2021.

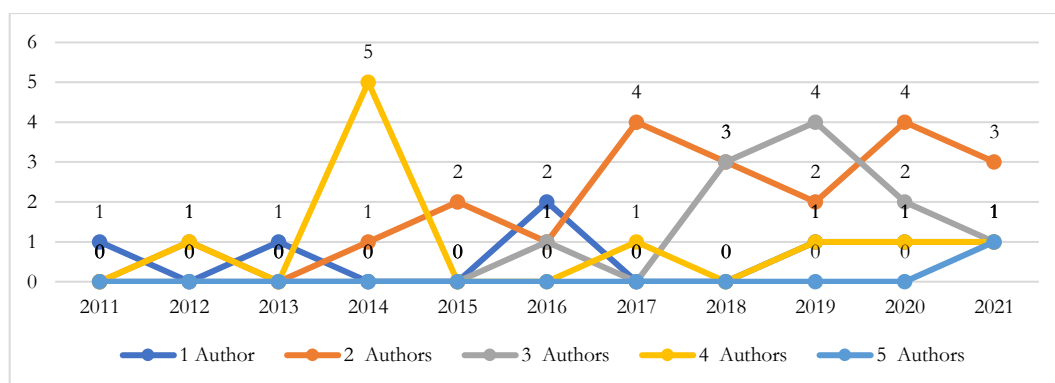


Figure 4. Number of authors in mobile learning research

If analyzed from year to year, in 2014 with 4 authors, it was in the top rank with 5 papers. 5 authors are the ones who produce the fewest papers, which is only 1 paper in 2021. As seen from Figure 3, overall among 45 papers, it can be seen that 1 author (n=7), 2 authors (n=21), 3 authors (n=11), 4 authors (n=10), 5 authors (n=1). After being analyzed, there are no articles with 6 or more authors. 2 authors became the top number that produced 21 papers.

3.6 Mobile Devices Used in Mobile Learning

Figure 5 shows the mobile devices used in mobile learning from 2011-2021.

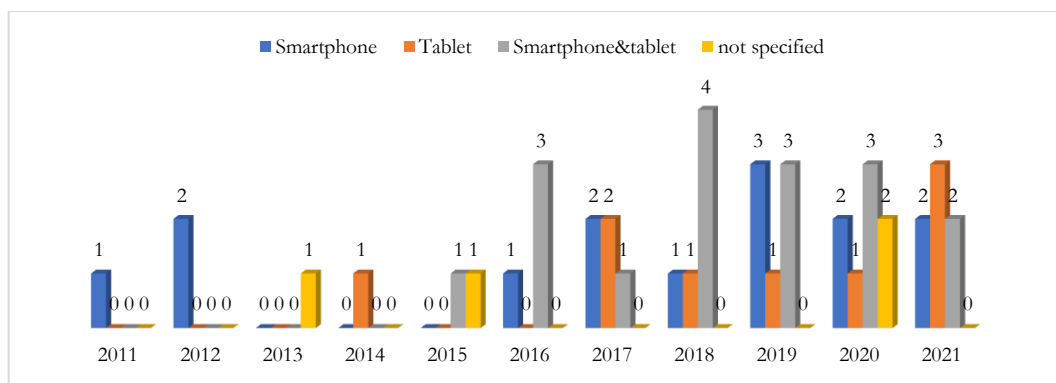


Figure 5. Mobile devices used in mobile learning for the period 2011-2021

According to Figure 5, it can be seen that the combination of smartphones & tablets in 2018 was in the highest rank, which was 4 articles. So most articles use smartphones and android as Mobile Devices used in mobile learning research. To see the total number of Mobile Device usage from 2011 to 2021, see Figure 6.

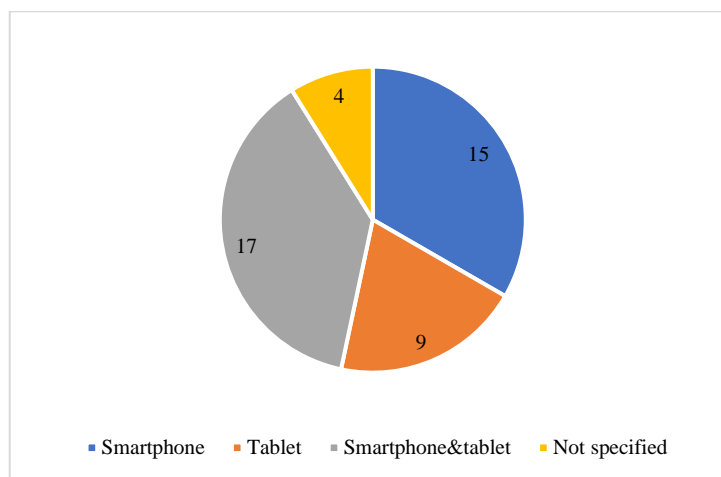


Figure 6. Number of mobile devices used in mobile learning

Based on Figure 6, it can be seen that overall the combination of smartphones and tablets has the largest number, namely 17 articles, smartphone use 15 articles, tablet use 9 articles, and 4 articles, the mobile device is not specified in the mobile learning article.

4. DISCUSSION

The flow study has prevailed with regards to introducing an exhaustive perspective on the past writing and some potential headings for specialists and instructors to

concentrate on mobile learning further. Regarding the primary examination question, which talks about the recurrence of the utilization of the term mobile learning in the title of the article for the years 2011-2021. The pattern will in general increment from 2013 to 2019, diminishing in 2020 and expanding again in 2021. A sum of 40 articles has the term mobile learning in the title while 5 articles don't contain the term mobile learning in the title. Circulation The number of articles with and without the term mobile learning in the title vacillated from 2011 to 2021. Obviously, this expansion is because of the expanded interest of specialists in mobile learning. Scientists and instructors in the field of mobile learning can rapidly react and adjust to propels in Information and Communication Technology (ICT). This finding is additionally upheld by research directed by Hwang et al (2011) where the utilization of the term mobile learning in the title has expanded from 2001-2010. The largest number of articles that have the term mobile learning in the title is 2019. While the largest number of articles without the term mobile learning in the title is 2020. So the utilization of the term mobile learning in the title is developing quickly from one year to another. Obviously, this increment is because of the expanded interest of analysts in mobile learning. Besides, scientists and teachers in the field of mobile learning rapidly react and adjust to propels in data and correspondence innovation (ICT).

According to the subsequent exploration question, it was observed that quantitative techniques rule in mobile learning research. This exploration is overwhelmed by quantitative examination in light of the fact that most mobile learning specialists see the viability or execution of mobile learning media to understudies by utilizing polls and tests. This is in accordance with the discoveries of Crompton et al (2016) where quantitative strategies and blended techniques are the most regularly involved methodologies in the examinations surveyed. Moreover, Zakaria (2019) additionally makes reference to in his exploration that quantitative is the most broadly involved technique in investigating client points of view and impression of M-learning and mobile learning in proper instruction. Subjective strategies are additionally utilized reliably. As far as distributions, subjective strategies are well known among mobile learning scientists in 2020 while quantitative techniques are famous in 2017. By and large, the recurrence of exploration strategies broke down is from 2011-2021, quantitative techniques (n=21) have the most elevated position, subjective strategies (n=19), blend strategy (n=3), and Research and Development (RnD) (n=2). So quantitative strategies are liked in this mobile learning research.

The third factor expects to distinguish the most useful nations in mobile learning research in 2011-2021. Turkey (26.08%) contributed the most elevated contrasted with different nations in mobile learning research. This is on the grounds that the instruction framework in Turkey as of now utilizes a great deal of Technology, Information and Communication (ICT) media in its learning framework. One of them involves mobile learning media like cell phones and tablets in learning. This is as per news from the Anadolu Agency which expresses that Turkey will turn into a country with driving computerized innovation, particularly in the realm of instruction. So all media in schooling utilize advanced innovation, one of which is the utilization of mobile learning in the learning system. The subsequent position is followed by Indonesia (21.74%), South Africa, and Malaysia (17.39%), Thailand, China, and Spain (13.04%). A sum of 15 nations just has 1 paper.

The fourth factor expects to assess the number of distributions dependent on diaries in mobile learning research from 2011-2021. In light of the number of articles distributed in mobile learning, the Canadian Center of Science and Education, South African Journal of Education and International Journal of Education and Development

utilizing Information and Communication Technology turned into the most useful diaries in this examination, with 3 papers each. An aggregate of 6 diaries distributed 2 papers, and the rest distributed 1 paper. The conceivable justification for why the three diaries are useful diaries in this exploration is on the grounds that these diaries are enormous and thorough diaries in different disciplines, remembering for the universe of schooling. The Canadian Center of Science and Education is a diary that gives experimental and hypothetical investigations in all fields including schooling and offers help and administrations to instructors and specialists in Canada and all over the planet. Diary of the Canadian Center of Science and Education was established in 2006. The papers distributed in this diary are of the greatest quality identified with instructive innovation.

The fifth examination question expects to see the number of authors in mobile learning research in 2011-2021. Whenever examined from one year to another, in 2014 with 4 authors, it was at the high level with 5 papers. This is on the grounds that the arrangement of a coordinated effort between authors has turned into a pattern in mobile learning research. As per Wai-Chan's (2017) articulation which expresses that cooperative examination upholds scientists to amplify the advantages of the info got, augment yield and can trade thoughts and join their perspectives in taking care of troublesome issues. An aggregate of 5 authors is the ones who produce a minimal measure of papers, which is just 1 paper in 2021. As seen from Figure 3, by and large among 45 papers, it very well may be seen that 1 author ($n=7$), 2 authors ($n=21$), 3 authors ($n=11$), 4 authors ($n=10$), 5 authors ($n=1$). Subsequent to being investigated, there are no articles with at least 6 authors. 2 authors turned into the top number that delivered 21 papers.

The sixth perspective means to see the cell phones utilized in versatile learning. The mix of cell phones and tablets in 2018 was positioned the most elevated with 4 articles. This is on the grounds that cell phones and tablets are the electronic gadgets that individuals utilize the most. As per a report from Stock App, the quantity of cell phone clients on the planet will reach 5.3 billion in July 2021. So the utilization of cell phones and tablets as Mobile Devices is for the most part utilized in mobile learning research. Generally, the blend of cell phones and tablets has the biggest number, in particular 17 articles, cell phone utilizes 15 articles, tablet utilizes 9 articles, and 4 articles, the cell phone isn't determined in the mobile learning article.

5. CONCLUSION

In view of 45 articles distributed on mobile learning research in 2011-2021 shows that this examination has moved occasionally. The wellspring of the information base taken for this mobile learning research is ERIC. There are 6 factors talked about in this review during 2011-2021, to be specific the utilization of the term mobile learning in the title, research technique, number of authors, major contributing nations, the most useful diaries/adding to mobile learning examination, and cell phones utilized in mobile learning. The principal perspective is the utilization of the term mobile learning in the title. The outcomes show that the pattern will in general increment from 2013 to 2019, down in 2020, and expand again in 2021. So the utilization of the term mobile learning in titles is developing quickly from one year to another.

The subsequent perspective is the examination technique utilized in mobile learning research. The outcome is that subjective techniques overwhelm mobile learning research. The third perspective is about the most useful nations in mobile learning research in 2011-2021. The outcome is that Turkey has the most noteworthy commitment to mobile learning research. The consequences of the fourth exploration

question with respect to the number of distributions dependent on diaries in mobile learning research from 2011-2021 are that there are 3 diaries that distribute 3 articles each. The fifth perspective is the number of authors in mobile learning research. It was viewed that as in 2014 with 4 authors, it was in the high level with 5 papers. The aftereffects of the 6th examination question about cell phones utilized in versatile learning, specifically the blend of cell phones and tablets have the biggest number of 17 articles.

6. LIMITATIONS AND RECOMMENDATIONS

This review gives a careful union of the past writing and some potential headings for analysts and teachers to additional review mobile learning. This review can give further bits of knowledge to instructors to utilize mobile learning to design their expert advancement programs comprehensively. Albeit the aftereffects of the writing give a wide outline, there are limits that should be thought of. In the first place, the current review is restricted to diary articles identified with mobile learning distributed in ERIC's data set; in this manner, the outcomes might vary contrasted with other logical data sets. Note that publication areas, remarks, book parts, book audits, and so on, are excluded for examination. Then, at that point, this exploration is restricted as far as the period of time.

In light of the impediments referenced above, the specialist proposes that more sorts of articles ought to be remembered for this precise writing audit of mobile learning and that a more extended timeframe be used in future writing studies. This is to give more logical perspectives on research on mobile learning.

7. REFERENCES

- Crompton, H., Burke, D., Gregory, KH, & Gräbe, C. (2016). The use of mobile learning in science: a systematic review. *Journal of Science Education and Technology*, 25 (2), 149-160. <https://doi.org/10.1016/j.compedu.2018.04.007>
- Henrie, CR, Halverson, LR, & Graham, CR (2015). Measuring student engagement in technology-mediated learning: A review. *Computers and Education*. <https://doi.org/10.1016/j.compedu.2015.09.005>
- Hockly, N. (2013). mobile learning. *English Language Teaching Journal*, 67(1), 80-84. <http://dx.doi.org/10.1093/elt/ccs064>
- Hung, JL, Zhang K. (2012). Examining mobile learning trends 2003–2008: A categorical meta-analysis using text mining techniques. *Journal of Computing Higher Education* 24(1), 1–17. <http://dx.doi.org/10.1007/s12528-011-9044-9>
- Hwang, GJ, Tsai CC. (2011). Research trends in mobile and ubiquitous learning: A review of publication in selected journals from 2001 to 2010. *British Journal of Educational Technology*, 42(4), E65–E70. <http://dx.doi.org/10.1111/j.1467-8535.2011.01183.x>
- Liu, M., Scordiono, R., Geurtz, R., Navarrete, C., Ko, Y., Lim, M. (2014). A look at research on mobile learning in K-12 education from 2007 to the present. *Journal of Research of Technology in Education*, 46(4), 325–372. <https://doi.org/10.1080/15391523.2014.925681>
- Liu, Y., Han, S., & Li, H. (2010). Understanding the factors driving m-learning adoption: A literature review. *Campus-Wide Information Systems*, 27(4). <https://doi.org/10.1108/10650741011073761>
- Muslimin, M., Mohd Nordin, N., Mansor, A., & Md Yunus, M. (2017). The design and development of MobiEko: A mobile educational app for microeconomics module. *Malaysian Journal of Learning And Instruction*, 221-255.

- Yusoff, N., & Daud, Y. (2015). Level of readiness of postgraduate students in the use of m-learning. National Research Seminar 2015 “Strengthening Scholarships Through Research” 592. <http://dx.doi.org/10.5539/ass.v8n12p276>
- Nawi, A., & Isa Hamzah, M. (2013). The acceptance level of mobile phones as m-learning in Islamic education. *Turkish Online Journal of Distance Education*, 16(1), 184-192. <http://dx.doi.org/10.17718/tojde.30611>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines?. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Traxler, J., & Kukulska-Hulme, A. (2016). *mobile learning: the next generation*. London: Roudledge. <http://dx.doi.org/10.4324/9780203076095>
- Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: the moving finger writes and having writes. *International Review of Research in Open and Distance Learning*, 8(2). <http://dx.doi.org/10.19173/irrodl.v8i2.346>
- Traxler, J., & Vosloo, S. (2014). Introduction: the prospects for mobile learning. *Prospects: Quarterly Review of Comparative Education*, 44(1), 13-28. <https://doi.org/10.1007/s11125-014-9296-z>
- Twum, R. (2017). Utilization of smartphones in science teaching and learning in selected universities in Ghana. *Journal of Education and Practice*, 8(7), 216-228.
- Volsoo, S. (2015). *mobile learning: key principles for success*. Retrieved from Center For Education Innovations <http://www.educationinnovations.org/research-and-evidence/mobile-learning-key-principles-success>
- Wai-Chan, S. (2017). International research collaboration creates higher impact. *Nordic Journal of Nursing Research*, 37(2), 59–60. <https://doi.org/10.1177/2057158517706259>
- Wingkvist A, Ericcson M (2011) A survey of research methods and purposes in mobile learning. *International Journal of Mobile and Blended Learning* 3(1), 1–17. <http://dx.doi.org/10.4018/jmbl.2011010101>
- Zakaria, M. Ikhran., Maat, Siti M., Khalid, Fariza. (2019). A systematic review of m-learning in formal education. *International Journal of Innovation, Creativity and Change*, 7(11), 1-24.

Author Biographies

Siti AISYAH	M.Ed., Teacher, State Senior High School 92 Jakarta, Jakarta 14130, Indonesia. E-mail: sitiaisyahmignon2018@gmail.com ORCID: https://orcid.org/0000-0002-8398-6084
Afrizal AFRIZAL	Associate Professor, Department of Chemistry Education, Universitas Negeri Jakarta, Jakarta 13220, Indonesia. E-mail: afrizal@unj.ac.id Website: https://fmipa.unj.ac.id/s2pendkimia/?page_id=2928
