Analysis of Documents Published on Mobile Technology of Hearing Impaired in Web of Science Database

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Abstract—The aim of this study is to determine the latest trends in mobile technologies used in the education of the hearing impaired. Technology integration studies in the literature generally focus on visual dictionaries, sign language, word exercises or story books. In addition, it is seen that the studies report the results, not the process. However, there are few studies that describe the holistic technology integration process with a holistic approach. The study was conducted using qualitative research methodology, document analysis and related content analysis. Working with the keywords "mobile technology and hearing impaired" in Web of Science database is based on the analysis of published documents. All articles published in Web of Science have been examined. Affiliated universities of the distribution, subject areas, document types, country / regions and author themes by years were examined. Various findings reveal in terms of determining the importance of the analysis of the studies published in Web of Science database on the hearing impairments through mobile learning in terms of content. A total of 54 studies were analysed. It was concluded that the most studies related to technology were carried out in 2001 and 2019. It turns out that the first study was carried out in 2001.When literature review was done, it was concluded that most studies were

conducted in 2019. It was also concluded that the most studies were in the field of Computer Science Theory Methods. It is mostly published as a full text. When looking at the scanning areas in the Web of Science index, it was seen that the most study area is in the Conference Proceedings Citation Index-Science area. When the universities of the researchers were analysed, it was also concluded that the researcher who carried out the most research was from Anadolu University. Although technology is very important in education, the effects of mobile learning on the hearing impaired should be further investigated and results should be shared.

Keywords—Learning, technology, Web of Science, Hearing, Hearing Impaired

1 Introduction

Recently, developing information and communication technologies affect the field of education as well as other fields, and change the methods of learning and teaching [12,28]. Over the years, different educational applications such as books and magazines have been replaced by various electronic devices. Developments such as mobile devices, netbooks, smart phones, and increasing internet speeds make it necessary to learn from mobile devices. And lastly, the introduction of new concepts and skills such as "mobile reading" and "mobile learning" have been gradually changing the reading and learning skills based on actual products. Moreover, technological tools have made it a lot easier to access any kind of information from anywhere, at any time, to follow innovations and continue learning [27,18]. There are various benefits such as learning new information on the go, using time effectively and efficiently while waiting, answering questions quickly. The concept of "mobile", which stands out with communication technologies, is used in the sense of wireless communication, mobility and portability. Portable devices that provide quick access, use and processing of information are generally listed as tablet computers, smartphones, MP3 players [23]. Educational activities carried out with these tools are also called mobile learning. Educational activities carried out with these tools are also called gamification [31]. Technological tools have a rich literature on their positive reflections in literacy teaching [21]. Takacs, Swart and Bus [16] performed meta-analysis of 29 studies, concluding that multimedia story books are more useful than classic (printed) story books [16].

Ally [2] in her study defines mobile learning as "providing electronic learning materials to mobile computing devices to allow access anywhere and anytime". Looking at other definitions, mobile learning emphasized students' mobility and nomadism. Ally [3,4] predicted that today's students would like to have access to the course content available on mobile devices anytime and anywhere. For this reason, mobile learning is considered a strong educational element to facilitate learning experiences. It provides students with easy and fast access to learning resources anytime, anywhere using mobile technologies. In order to understand the effectiveness of mobile learning, first of all, it is necessary to examine the studies of

researchers who work on this topic. M-learning can be seen as an extension of E-learning, mobile devices [24,35].

Each individual has different characteristics and abilities. Each individual's learning is also different. general education services are insufficient and special education services are needed [22,6] for individuals with significant differences. Education, which is offered to meet the educational needs of individuals who show significant differences from their peers in terms of their individual characteristics and educational competencies, and who need special education, therefore, is developed as a "special education".

The development of mobile technologies among students with disabilities should be important for entrepreneurs [34]. In the results of their work, Yalap, Yılmaz, & Polatçı [29], concluded that psychological capital affected entrepreneurship intent more than communication skills. In addition, among the sub-dimensions of psychological capital, only self-efficacy has a positive effect on entrepreneurial intent, and has revealed that others have no significant effect. Researcher researched to examine the factors that may prevent seizure of technologies for the disabled and to eliminate them as much as possible. Factors that contribute to the acceptance of technology can be complex, such as "perceived usefulness", "self-efficacy" and "social impact". The research concludes by offering suggestions for the development of a temporarily modified Technology Acceptance Model that will be tested while continuing, taking into account the special conditions for disability groups' use of technology [26].

Literacy is a basic skill for social roles such as social participation and interpersonal communication [30]. Linguistic scientific approaches assume that literacy emerges from verbal language that develops naturally. According to Magee [32], children acquire their phonological awareness and speeches near the basic phonological sound systems of the language. Hearing impaired individuals, however, are severely limited because the language's audio systems are not accessible. Many studies show that children with hearing disabilities exhibit low literacy performance and have difficulty in achieving their literacy levels of normal hearing peers [9,20]. Coskun & Mitrani [8], in his study, is to design an effective instruction on the Dick and Carey Model and design a game-based learning that encounters problems with word acquisition in order to obtain a predefined number of words at a given time for the student who has learned a dyslexia. Studies measuring the effectiveness of technology-impaired individuals have been increasing [25].

Karal and Şılbır [36] revealed that hearing-impaired students had limited vocabulary and experience pronunciation problems. The results of the research determined the opinions of the instructors about technology, online education, competencies, problems and adobe connect. As a result of the research, it has been revealed that the instructors need in-service training to have sufficient information about the online training platforms, they have a sufficient level of interaction with adobe connect connection, and they need immediate communication with the distance education centre in technical problems.

Kuzu, Odabaşı, & Girgin [16], one of the studies with hearing impairment, aimed to reveal how hearing-impaired students use mobile technologies in their teaching

activities, in communication with each other and with their lecturers, and in their daily lives. In their research, it was designed as an action research and its application was carried out with 12 hearing impaired students attending the "BİL151 Basic Information Technologies-I" course, which was taught within the body of Graphic Arts Department of Applied Fine Arts Department of Anadolu University for the Disabled in the fall semester of the 2007-2008 academic year. Basic Information Technologies course within the scope of the research was carried out for 16 weeks with PDA support. On certain days of the week, students performed the online activities given on the course's blog, accessing the materials on the course's website; They participated in four-hour face-to-face lesson activities one day of the week.

1.1   The purpose and importance of the study

The purpose of this study is to systematically analyse the articles which were gathered from Web of Science database with selected keywords by examining according to designated themes through discussing with other related basic concepts. Through this research the views regarding the use of mobile teaching in hearing impaired was evaluated to contribute to further studies in the related subject areas.

Limitations

- This research is limited to the selected and reviewed documents in the Web of Science database.
- The research is limited to the documents published between the years 2001 and 2019
- The content analysis of the documents is limited to the 5 themes specified above.

2   Method

In this study, qualitative research methodology is being carried out by using document analysis and related content analysis. The basic process in content analysis is to compile similar data within the framework of determined concepts and themes and interpret institutions in a way that readers can understand. Basically, content analysis is a scientific framework that enables systematic analysis of written, oral and other sources.

2.1   Data collection and analysis

Within the scope of the research on hearing impaired learning through the mobile teaching method, primarily search was conducted on Web of Science database using the keywords "mobile teaching and hearing impaired" between the years 2001 and 2019, and the search yielded 54 documents which were presented in Figure 1. The documents retrieved through the Web of Science database were analysed, and integrated by correlation with each other. Also, the data was analyzed through content analysis.
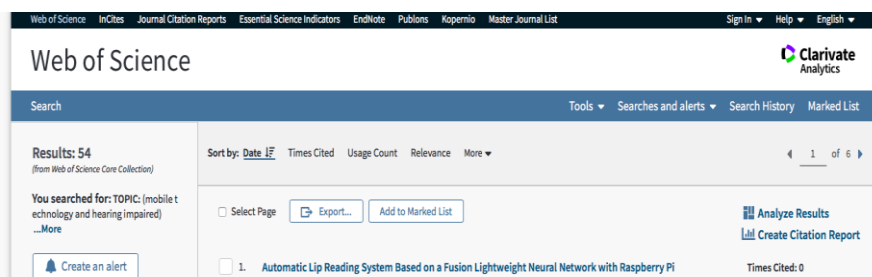
Fig. 1. The documents accessed on Web of Science database through keywords "mobile teaching and hearing impaired"

3 Findings

3.1 The distribution of the documents by the years

Distributions of the documents between the years 2001 and 2019 were examined. In this context, 54 studies were available on Web of Science database; their distribution was presented in Table 1.

Table 1. Distribution of the Documents by the Years:

Years	Frequency
2019	11
2018	9
2017	8
2016	8
2015	2
2014	3
2013	1
2012	3
2010	2
2009	2
2007	2
2006	1
2004	1
2001	1

The analysis revealed that most of the studies regarding the hearing-impaired learning through the mobile teaching method were conducted between 2001 and 2019, where at first the study was conducted in 2001 and further in 2002, 2003, 2005, 2008 and 2011 no studies were done.

3.2   Distribution of the documents by subject areas

Table 2. Distribution of the Documents by Subject Areas

Subject Area	f
Computer Science Theory Methods	17
Engineering Electrical Electronic	14
Computer Science Information Systems	12
Computer Science Interdisciplinary Applications	10
Telecommunications	9
Computer Science Cybernetics	5
Education Educational Research	5
Computer Science Artificial Intelligence	4
Engineering Multidisciplinary	4
Automation Control Systems	3
Computer Science Software Engineering	3
Ergonomics	3
Audiology Speech Language Pathology	2
Chemistry Analytical	2
Engineering Biomedical	2
Instruments Instrumentation	2
Medicine General Internal	2
Neurosciences	2
Otorhinolaryngology	2
Rehabilitation	2
Business	1
Chemistry Multidisciplinary	1
Communication	1
Computer Science Hardware Architecture	1
Economics	1
Information Science Library Science	1
Literature	1
Management	1
Materials Science Multidisciplinary	1
Operations Research Management Science	1
Physics Applied	1
Psychology Multidisciplinary	1
Transplantation	1

Analysis of the study shows that Computer Science Theory Method (17) and Engineering Electrical Electronic (14) were the major subject area. Whereas, subject areas with the least focus were transplantation (1), Psychological Multidisciplinary (1), Business (1), Chemistry Multidisciplinary (1), Communication (1), Computer Science Hardware Architecture (1), Economics (1), Information Science Library Science(1), Literature (1), Management (1), Materials Science Multidisciplinary (1), Operations Research Management (1), Science (1), Physics Applied (1).

3.3 Distribution of the documents by document types

This portion of the paper analysed on the distribution of the texts by document types the data in Table 3 below revealed the results.

Table 3. Distribution of the Documents by Document Types

Document Type	F
Proceedings Paper	34
ARTICLE	19
Editorial Material	1
Review	1

The above data disclosed the fact that major part of the study was conducted on Proceedings Paper and Articles with a frequency of (34) and (19) respectively. On the other hand, Editorial material and review with frequency (1) each were not taken into account much while conducting the studies.

3.4 Distribution of the documents by Web of Science index

Table 4. Distribution of the Documents by Web of Science Index

Document type	f
Conference Proceedings Citation Index-Science	31
Science Citation Index Expanded	12
Emerging Sources Citation Index	8
Conference Proceedings Citation Index-Social Sciences	5
Humanités Social Sciences Citation Index	5

While considering the area of screening in the web of science index, from the above table, it was found out that "Conference Proceedings Citation Index-Science" with the highest frequency of 31 was the most used index. And "Conference Proceedings Citation Index-Social Sciences" and "Humanities Social Sciences Citation Index" were the least used Index with a frequency of 5 each.

3.5 Distribution of the documents by the authors' affiliated universities

Table 5. Distribution of the documents by the Authors' Affiliated Universities

Affiliation	F
Anadolu University	2
Carl Von Ossietzky Universität Oldenburg	2
Cluster Excellence Hearingall	2
Cyprus University of Technology	2
Plovdiv University	2
AHRR - Al Imam Muhammad Ibn Saud islamic University	1
Al Kafeel Univ Collage	1
Al Kafeel Univ Coll	1
Aristotle University of Thessaloniki	1
Beijing Union University	1

The distribution of documents' authors affiliated from different universities so a diversified data table was formed. This data revealed that the author with more publications were affiliated to Anadolu University, Carl Von Ossietzky Universitat Oldenburg, Cluster Excellence Hearingall, Cyprus University of Technology and Plovdiv University.

4 Conclusion and Discussion

The web of Science database provided 5 topics and 54 documents, on searching by the keyword "mobile teaching and hearing impaired". Moreover, themes were also determined as content analysis. Furthermore, the analysis of the distribution of documents was done from publication year 2001.i.e. the first year of publication to 2019. And the analysis showed a major fact that the study was not conducted in the years 2002, 2003, 2005, 2008 and 2011.

The analysis of the study revealed that major part of the study was concentrated on Computer Science Theory Methods (17) and Engineering Electrical Electronic (14). While the less considered subject area as per conduction of studies were concerned; Transplantation (1), Psychology Multidisciplinary (1), Business (1), Chemistry Multidisciplinary (1), Communication (1), Computer Science Hardware Architecture (1), Economics (1), Information Science Library Science (1), literature (1), Management (1), Materials Science Multidisciplinary (1), Operations Research Management (1), Science (1), and Physics Applied (1) were at the bottom of the list. When we looked at the studies, it has positive attitudes towards the use of technology in the classroom and this use can lead to significant gains in learning [19,15], students' studies [7,30,25,5] and teachers [11] [7] [14]. When we look at the year ranges and subject areas of the studies, we see that they were used in the field of computer and education [13]. Kuzu, Odabaşı, & Girgin [17,22] examined the purposes of using mobile technologies to support hearing impaired students in their article.

When the studies on hearing impaired learning through the mobile teaching method were analysed, it was revealed that most of the studies were conducted on the

document types of proceedings paper (34), article (19), Editorial material (1) and review (1). An e-learning activity designed by the researcher, which can be facilitated through portable computers, was designed [24]. Fagerberg, Rekkaedal and Russell [10] defined this as the use of mobile technologies in the education world. Similarly, Georgiev, Georgieva and Smrikarov [33] defined m-learning as the new form of existing e-learning and distance learning applications. The common point of these definitions stems from the transfer of learning content to students through wireless networks via mobile devices [1,16].

When looking at the areas of screening in the web of science index, it was seen that the most study is in the "Conference Proceedings Citation Index-Science (31)" index. The least study is in the field of "Conference Proceedings Citation Index-Social Sciences and Humanities Social Sciences Citation Index" (5).

The analysis also revealed that the author who published the most is affiliated with Anadolu University (2), Carl Von Ossietzky Universität Oldenburg(2), Cluster Excellence Hearingall(2), Cyprus University of Technology(2), Plovdiv University(2).

If we assume that all are equal, we cannot ignore the existence of people with disabilities. The main reason for handling hearing impaired individuals from disability groups is to be effective as it transmits sound in using many technological devices. For this reason, we have discussed mobile technologies from technological tools. We investigated, in which areas mobile technologies are used by the hearing impaired. As a result of the literature review, it was concluded that the researches done in the area of hearing impaired in mobile technologies are similar and generally in the same fields. It can be suggested to increase these researches and to carry out researches in different fields.

5   Acknowledgements

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