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Trends in Instructional Technology Researches for the Disabled Individuals in Turkey

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Abstract

The following study has been conducted in order to provide a survey of the research being done into disability and education in the Turkish context. The purpose of this study is to investigate the trends in the researches related to the educational environment of the disabled individuals from various aspects by analyzing the content of the scientific research articles in the field of instructional technology. It is hoped that the findings can help more disabled people in Turkey benefit from the opportunities information and communication technologies now provide.

For this purpose, 72 studies conducted by Turkish scientists between 2007-2017 found in national and international databases were scanned and analyzed. These articles were analyzed via deductive content analysis and the "Article Classification Form". As a result of the analysis it was found that the preferred language used in publications is English, studies are evenly distributed according to disability type, experimental research design is used more often than another design and instructional environments and design development with technology were preferred subjects of study. As data collection tools, observation and interview methods were most commonly used, Purposeful sampling was used, and quantitative analysis methods most commonly adopted. It is expected that the results obtained will shed a light on future studies and have a positive impact on the experience of people with disabilities in the education system in Turkey.

Türkiye'de Engellilere Yönelik Öğretim Teknolojileri Araştırmalarındaki Eğilimler

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Öz

Bilgi ve iletişim teknolojileri günümüzde güncel bilgiye çabuk ulaşım, iletişim gibi ihtiyaçları daha kolay çözümleyebilme konularında büyük yararlar sağlamaktadır. Engelli bireylerin de bu imkanlardan çeşitli amaçlarla yararlanabilmesinde gerçekleştirilen araştırmaların payı büyüktür. Bu çalışmanın amacı, engelli bireylere yönelik olarak öğretim teknolojisi alanında yapılan bilimsel araştırma makalelerinin içerik analizini yaparak engellilerin eğitim ortamlarına dair yapılan araştırmalardaki eğilimleri çeşitli açılardan ortaya koymaktır.

Bu amaçla yapılan alan yazın taraması sonucu 2007-2017 yılları arasında ulusal ve uluslararası veri tabanlarında Türk bilim insanları tarafından yapılan araştırmalar taranmış tam metin olarak ulaşılabilen 49 makale, 22 bildiri ve 1 kitap bölümü olmak üzere 72 çalışma incelenmiştir. Söz konusu makaleler "Makale Sınıflama Formu" kullanılarak tümden gelimsel bir yaklaşımla içerik analizine tabi tutulmuştur. Analiz sonuçlarına göre yayınlarda kullanılan dilin çoğunlukta İngilizce olduğu, çalışmaların engellilik türüne göre dengeli dağıldığı, daha çok deneysel araştırma türü kullanıldığı ve ağırlıklı olarak öğretim ortamları ve teknoloji ile tasarım geliştirme konularında

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çalışıldığı belirlenmiştir. Veri toplama aracı olarak en fazla gözlem ve görüşme, örneklem olarak da amaca uygun örneklem ve genellikle nicel analiz yöntemleri kullanılmıştır. Elde edilen sonuçların gelecek çalışmalara ışık tutacağı düşünülmektedir.

Introduction

Education is essential to development of society and it is a fundamental right of all individuals to have equal access to this opportunity. A significant proportion individuals in the community are losing their physical, mental, spiritual, sensory and social ability to some extent at birth or later for any reason These people, defined as disabled individuals, face many difficulties and obstacles in their daily lives. Examples of these difficulties that impede the integration of persons with disabilities into society include challenges such as training attendance, transportation, negotiating an inaccessible physical environment and communication tools. Critics in disability studies have foregrounded access to education as a priority underpinning the disabled population's ability to live as full members of society (Batu and Kırcaali-Iftar, 2005). Technological advancements and the opening up of educational opportunities have been heralded as a new dawn of educational access for all; nevertheless, when today's technological advances and opportunities in education are observed, it is seen that level of utilization of these facilities by disabled people is significantly lower than individuals without disabilities. On the other hand, when the number of technological products for disabled increased this could enable disabled people to improve their quality of life (Arrigo, 2005).

According to Turkey's 2011 Population and Housing Research results, 4.882.841 people stated that they experienced difficulties with their sight, hearing and speech, or that they had difficulty in performing everyday activities such as walking, climbing the stairs or down the stairs or carrying or holding a weighted object. That number also included people who stated that they had difficulties with learning when compared to their peers, or arraying out four simple operations (sum, minus, product, division) maintaining concentration and remembering things easily was challenging for them (TUİK, 2015). This number translates into, in 2011, 6.6% of the total population of Turkey who disclosed that at least one disability was impacting upon their lives. Among the illiterate population (6 years of age and over), 23.3 per cent disclosed that they had difficulty in fulfilling at least one function. According to the same research results, this number was 4.5% for the population taken as a whole (Aytaç, 2015).

Further data from the Ministry of National Education Strategy Development (2019) showed that for the 2011-12 school year the number of the students formally enrolled in special education schools in Turkey was approximately 212.617 and for the 2017-18 school year the figure was 353.610. Given the high number of people who mentioned some kind of impairment or disability in the 2011 survey, this number is noticeable as it reflects a very low percentage of the total school age population, suggesting that many young people who would benefit are not currently receiving education that caters adequately to their needs.

The Ministry of National Education specifies that in order to meet the educational needs of people with disabilities, individualized education schedules, appropriate teaching and learning methods, purpose-built spaces and specially-trained staff are required (Ministry of National Education, 2007). However, in order to assess the implementation of such policies, comprehensive surveys are needed so that is possible to understand the relationship between needs and access and highlight new cases of specific impairments so that those involved in education can detect, explore and hope to solve the problems arising (Bolat and Sözen, 2012). It is obvious that increased research into education and disability in particular, can make an important contribution to the opening up of educational environments to disabled people.

Assistive Technologies (AT) is an area which has come to be recognized as key to facilitating access for those with special educational needs. In addition to the specific benefits in the classroom, various global bodies have stressed that AT should be developed in areas where the individual skills of disabled people are inadequate in order to facilitate their lives so that they can integrate into the society more easily and can become more successful individuals. A UNESCO Global Report in 2013 thus found that the

successful application of such technologies can make classrooms more inclusive, physical environments more accessible and teaching and learning content and techniques more in tune with learners' needs.

Assistive technologies used in special education can be any tool that enables individuals with disabilities enrolled in special education classrooms to realize their potential (Hager and Smith, 2003; Johnstone, Thurlow, Altman, Timmons and Kato, 2009). Assistive technologies devices are intended to be used by individuals who have disabilities of different kinds and have different levels of function so that individually they are enabled to assert their independence and minimize their disadvantages in educational environments (Maor, Currie and Drewry, 2011). Moreover, the more general advances in Information and Communication Technologies (ICT) have offered various ways to engage in education for the disabled population. Indeed, D'Aubin argues that ICT holds great promise for people with disability because it can reduce or eliminate many barriers, which under other circumstances might impair or prevent disabled people from participating in day-to-day activities (D'Aubin, 2007). It is to be hoped that as research on the possibilities of using technology to enhance disabled people's engagement in education increases, the enrolment rates of the disabled population will increase.

Existing studies conducted in this field have focused on the development of computer-aided education, the web applications in use and the efficiency of these technologies used in these teaching environments. Various trends in the use of technologies for learning in special education have emerged and distinct research directions outlined. For example, Liu, Wu and Chen (2013) argued that previous studies focusing on the implementation of learning technologies in special education fall into three broad research directions: evaluating the effectiveness of using learning technology with special education students, designing educational activities using learning technology, and special education students and their teachers' affective responses toward learning technology. In many studies, specific softwares prepared in different areas have been evaluated. In one example focusing on hearing-impaired students, Demirhan (2008) investigated the effectiveness of software developed for lessons in Turkish, Mathematics and Life in a technology-equipped class and positive results were obtained. Similarly, Karal, Şılbır and Küçüksüleyman (2009) focused on the learning of prepositions and tense suffixes in Turkish language among hearing-impaired students and determined that materials supported by visual aids had positive effects on reading and writing skills.

There is a large body of research showing that instructional technologies have a positive impact on learning and particularly with developmentally-disabled individuals. Özak and Avcıoğlu in their 2007 study found that simultaneous prompting presented by computer assisted instruction was effective in the teaching of reading skills to children with development delays. A further study found that computer-based instruction was effective in teaching students with development disabilities the skills of understanding which emergency service to call in specific emergency situations, and in memorizing and reciting the telephone numbers of those services. (Yücesoy, Özkan, Öncül and Kaya, 2013). In a study focusing on technology for the visually-impaired, Eskinazi(2011) made use of universal design principles to prepare an accessible website, including online lessons, and tested it with ten students in order to disseminate the computer literacy education of visually-impaired individuals. The result showed that the internet site was accessible for these users.

When the existing literature is examined, we can see that there have been many studies on the benefits of using educational technologies in the education of people with disabilities. For the purposes of this paper, concentrating on previous studies carried out by researchers in Turkey will act as a guide for what is needed to be done to help more people with disabilities access the education they are entitled to. The following study thus fills a gap in that it surveys the already-existing li b terature on this topic that has been done about and within Turkey, and investigates and suggests research trends that are related to the educational environment of the disabled in the hope that this will help influence the future direction of studies in this field.

Some studies investigating the trend of educational technology in Turkey are as follows: A work examine Turkish educational technology studies in the academic literature within the scope of SSCI (five journal), and to reveal methodological trends within these studies (Göktaş et al, 2012), current trends in

educational technology research in five major universities in Turkey (Şimşek et al, 2008), evaluation of master theses in computer and instructional technologies in terms of content and method (Akça-Üstündağ, 2009), Examination of trends in the study published in a journal in the field of educational technology addressing Turkey (Alper and Gülbahar, 2009), content analysis of the graduate thesis on e-learning environments for people with disabilities (Göker and Tekedere, 2016). But in Turkey, there has not been any study of content analysis on scientific publications released in the field of instructional technologies for people with disabilities. Independent researches conducted to evaluate disabled people with a holistic view for a certain period of time and draw attention to the areas that are lacking and will help develop the field. Doing scientific researches to enhance the quality of teaching for the disabled and maintain the consistency, and overview of the studies on the issue in the literature are considerably important in terms of both giving opinions about the quality of the related researches demonstrated currently or guiding for the benefit of future researches. Having known about the studies on this topic along with deficiencies and needs to be fulfilled in the literature can assist the researchers while determining the topics to be focused on. Hence, examination of scientific articles published in the field of instructional technologies for the disabled in terms of many criteria is needed.

The objective of this study is to indicate the general trends of academic interest in this field by analyzing the content of Turkey-focused research articles, specifically published in scientific journals represented in the national and international databases and focused on the field of instructional technology in order to determine the needs in the field. Within the scope of this study, the following questions in relation to research about educational technologies for the disabled (defined in our study as those with vision and hearing impairments or those with developmental delay) were defined:

1. What are the distribution by types of publication, field indices and publication language that researches made in field of educational technology?
2. Which topics were researched based on disability type in educational technology and what is the distribution by years?
3. Which types of research were commonly used in educational technology studies?
4. Which research patterns/methods were used frequently in educational technology studies?
5. Which data collection tools were often used in educational technology studies?
6. What kinds of sample groups are used and what are the sample sizes?
7. What data analysis methods are commonly used in educational technology studies?

Method

In this study, Turkey-focused research studies on educational technologies for people with disabilities were examined by the method of document analysis. Document analysis is a process by which critics analyze the written documents that concentrate on cases and events related to the topic being researched (Yıldırım and Simşek, 2016).Content analysis, a qualitative research method, was used to analyze the documents. According to Yıldırım and Simşek (2016), content analysis is used to classify the similar data based on identified concepts and themes, and to interpret these by editing for good readability. In content analysis, gathered units are determined and displayed through classifying items according to their frequencies. Using the content analysis method enables research to be evaluated across various different criteria, such as method, subject, sample, data collection and data analysis etc. Associating the dimensions that determine the trends in the research undertaken provides the opportunity to evaluate the field of researchers in the relevant area with different perspectives (Göktaş et al, 2012). Content analysis also gives you a holistic view of the area. They also help to determine the current trends in the area and assist in determining which topics in the field are working adequately and what kinds of research gaps exist (Şimşek et al., 2008). Furthermore, with content analysis studies, it is possible to determine in what way trends change over time.

Context of the Study

The context of this study is comprised of articles and symposium papers which were released in all Turkey-focused national and international journals and symposiums within the field of educational

technologies for people with visual, auditory and developmental disabilities. However, the study sample consists of 57 publications which were released in the last decade between the years 2007-2017 and that were available to us via the database listings. The studies were also selected using criterion sampling, chosen because our focus was limited to research related to special education within a specified date range. Research about the disabled and educational technologies between the years 2007-2017 were searched for in both Turkish and English languages in the related academic databases by inserting terms of "visually impaired", "hearing impaired", "mentally impaired", "educational technology", "instructional technology" and "Turkey" so as to find out the studies in the literature. Articles reviewed within the scope of this study have been shown in Appendix1

Data Collection Tool

The Educational Technologies Publication Classification Form (ETPCF) developed by Göktaş et al. (2012) was used as a data collection tool. The form comprises an identification record part including the names of the authors of the examined article, the name of the journal in which the article was published, and other sections displaying the type, topic, method, data collection tools, sample and data analysis methods of the articles. The characteristics of the studies included in the research were examined detail with the Educational Technologies Publication Classification Form. The process carried out to extract complex data, make the data more meaningful and workable is called coding (Çıkrıkçı and Erzen, 2016). In order to assure the reliability of the coding, we followed the suggestions of Miles and Huberman (1984) in that all studies were assigned codes separately by the researchers and the “agreements” and “disagreements” on the codes were discussed. Moreover, the statements of “disagreements” were removed via a third coding stage that the researchers organized together (Göker and Tekedere, 2016). When the content analysis studies were examined, it was seen that they were generally classified in accordance with the distribution by research method, sample level, years of the study, data collection tools, sample number and topic, and they were coded similarly (Göker and Tekedere, 2016)

Data Analysis

The studies examined were first divided into categories via content analysis, and a distribution of frequency was used while presenting the data by description. Descriptive statistics allow the collection, description and presentation of numerical values for a variable and include techniques such as frequency, percentage, central tendency measures, variability measures and correlation coefficient used to describe the characteristics of a group (Büyüköztürk, 2002). In this way, frequency distribution was used to determine the distribution of scientific articles published in the field of instructional technology for the disabled according to publication types, field index, publication language, selected disability type, types of research study, research patterns/methods, and commonly-used data collection tools of the articles.

Findings

Data collected via Educational Technologies Publication Classification Form were analyzed in accordance with the research questions. The findings related to the studies conducted about educational technologies for people with visual, auditory and developmental disabilities are presented below.

Publication types, field indexes and publication language of the examined studies

Within the scope of this study, studies conducted by Turkish scientists in national and international databases between the years 2007-2017 were screened and 72 studies consisting of 49 articles, 22 papers and one book chapter, which can be accessed as full texts, were analyzed. When Table 1 is examined, it is found out that 65.3% (f=47) of the studies were conducted in English while remainder 34.7% (f=25) was in Turkish, and nine studies were published within the scope of SSCI (Social Science Citation Index) except one of the articles in Turkey-focused journals, 27 studies were taken from journals searched in field indexes and 8 studies were in the TR index. It was discovered that only 15 of

49 articles had been published in foreign journals, despite the fact that 36 of them had been released in English. The publications and copyright pages information that were reviewed within this study are displayed in detail in Appendix1.

Table 1.

Publication types, languages and field indexes of researches about instructional technology for the disabled

	SSCI	Field Index	TR index	Paper	Other	Book chapter	Total
Turkish	0	6	4	12	3	0	25
English	9*	21	4	10	2	1	47**

* Turkey-focused journals (Except one of the articles)

** 15 articles in foreign journals

Topics examined according to disability types and their distribution by years

The distribution of the research topics according to disability types in the field of educational technologies is seen in Table 2. When the table is examined, it is seen that the studies generally focused on the topics of "instructional environments and technology" and "design and development". It is also understood that there is no research on the topics such as systematic change, education and performance. There is only one research study related to research and theory, distance education, and teacher education.

Table 2.

Distribution of topics according to disability types in studies on instructional technologies for the disabled

Disability type	**Distance education / learning**	**Manage-ments of school**	**Design& Development(DD)-Instructional environments and technology(IET) – Multimedia(M)**				**Teacher training**	**Research and theory**	**Total**
			DD	**ITE**	**DD+ITE**	**IET+M**			
Vision	1		9	7		1			18
Hearing			3	8	8				19
Mentally			5	8	3	2			18
Mixed		4	1	10			1	1	17
Total	1	4	18	33	11	3	1	1	72

According to Table 3, it is clear that the numbers of studies concentrating on this area have not changed much over the years; however, a slight increase was observed in 2017. They can be broken down into the following topics: research on the hearing-impaired (f=19), visually-impaired (f=18), developmentally delayed (f=17) and inclusive of all three groups (f=17).

Table 3.

Distribution of topics by years according to disability types in instructional technologies researches for the disabled

Disability type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Vision	2	1	0	2	5	1	2	1	1	1	2	18
Hearing	0	2	7	2	1	0	0	2	2	2	1	19
Mentally	1	0	0	0	0	1	2	4	1	2	7	18
Mixed	2	0	1	4	0	3	2	0	0	2	3	17
Total	5	3	8	8	6	5	6	7	4	7	13	72

Frequently used research methods based on disability types

When observing the research methods applied according to disability types in the surveys about instructional technologies for the disabled (Table 4), it can be seen that the most commonly used methods are: experimental (practical) study (f=25); descriptive studies (f=13); and action research (f=9). There is a preference according to discrete disabilities: notably, in the cases of hearing impairment and developmental delay, experimental studies are the preferred research method, whereas action research has been used more in cases of visual impairment; literature reviews, and descriptive studies are preferred for mixed and visual types impairments. Furthermore, we note that no attention has been given to theoretical and occupational studies, but that likewise only a few literature review and evaluation studies have been conducted.

Table 4.

Research methods based on disability types in the studies about instructional technologies for the disabled

Disability type	Literature review	Theoretical study	Experimental (practical) study	Action study	Descriptive study	Evaluation study	Other	Total
Vision	4	1	1	4	4		4	18
Hearing			9	3	2		5	19
Mentally			14	1	1		2	18
Mixed	4		1	1	6	3	2	17
Total	8	1	25	9	13	3	13	72

Research patterns frequently used in instructional technologies research for the disabled

Figure 1 presents the method-related trends preferred when research into instructional technologies for the disabled is conducted. As seen in the figure, the patterns used have been determined as quantitative (f=32), qualitative (f=19), mixed (f=5) and literature review (f=6) respectively. The other 13 researches were not included in any group of method because they described only developed designs or introduction of projects.

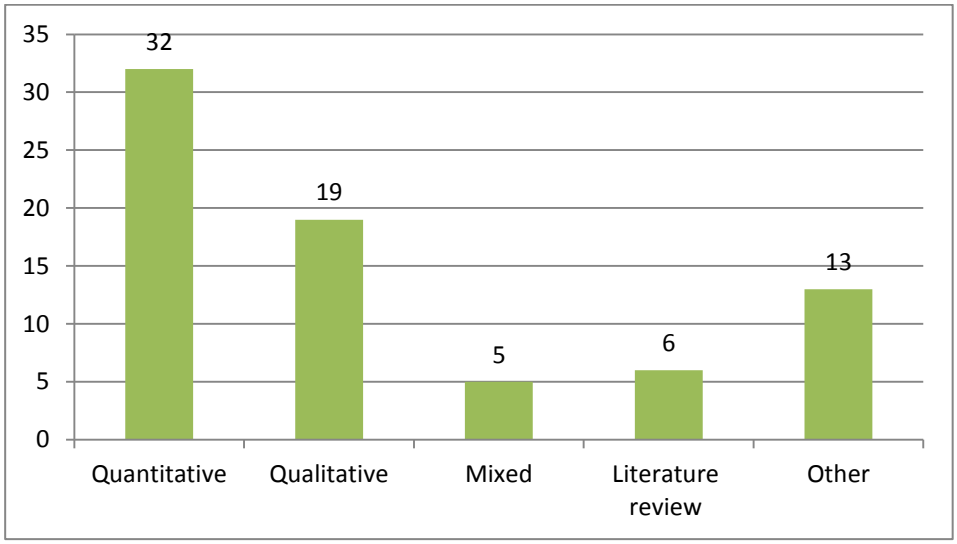

Figure 1: Methods used in instructional technologies studies for the disabled.

Data collection tools and analysis methods commonly used in instructional technologies studies for the disabled

The most commonly used data collection tools in instructional technologies studies for the disabled are observation (f=23) and interview (f=18) (Figure 2). After these, alternative vehicles (such as performance tests, diagnostic tests, concept maps, portfolios), survey, achievement tests, document reviews and attitude-perception-personality tests follow.

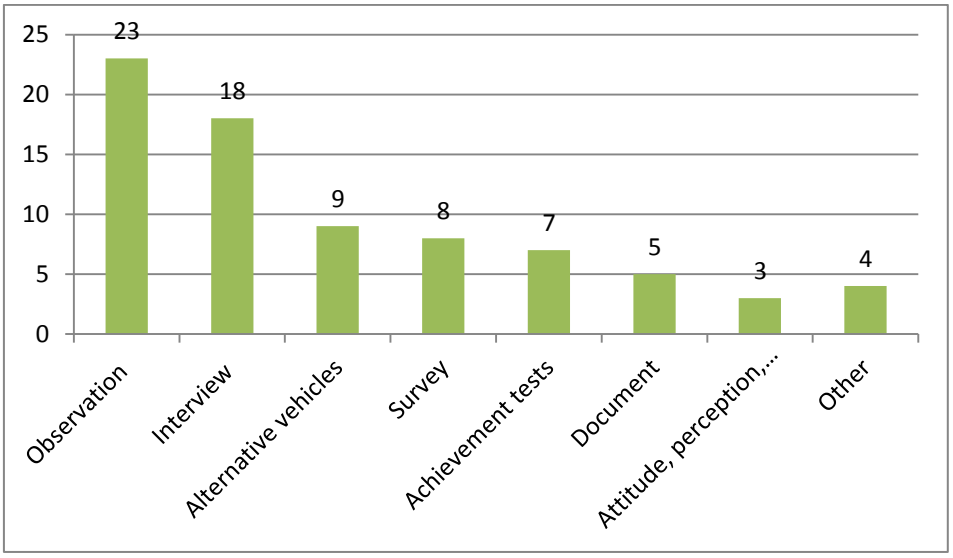

Figure 2: Commonly used data collection tools

Figure 3 demonstrates the distribution of data analysis methods which were commonly used in instructional technologies studies for the disabled. As we can see from the graph above, in terms of quantitative analysis, the method of descriptive analysis (mostly frequency, percentage, and chart) has been used most frequently. However, content analysis has been preferred as qualitative data analysis.

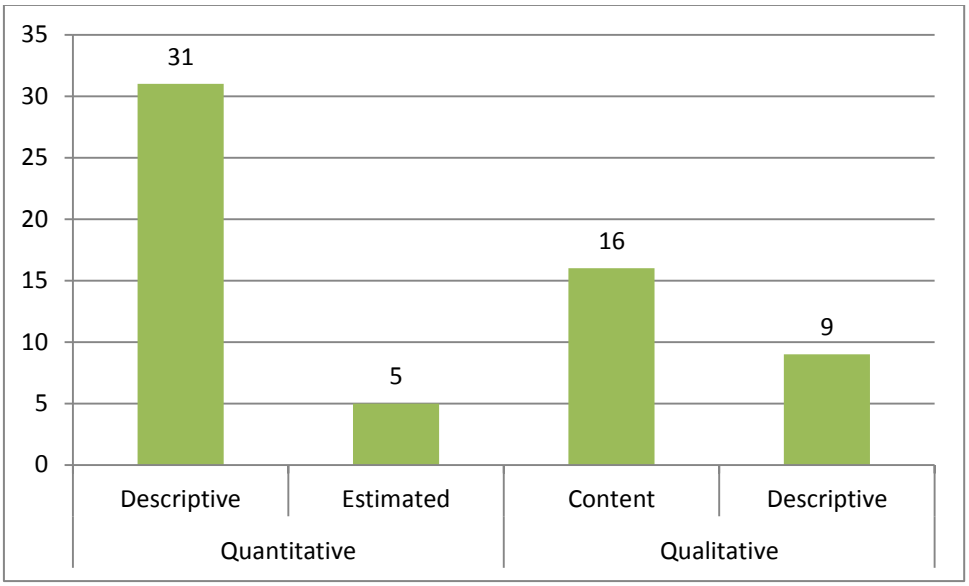

Figure 3: Distribution of commonly used data analysis methods

Levels of sample size and selection methods in instructional technologies studies for the disabled

It is seen that sample sizes in instructional technologies studies for the disabled are generally between 1-10; after this, the range of 11-30 follows (Figure 4). The studies conducted in other ranges are fewer in number and they are accepted as screening studies.

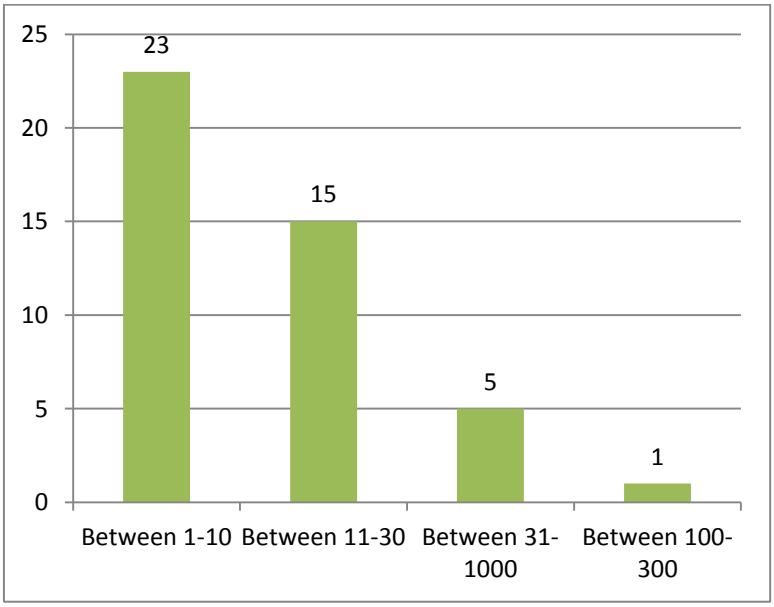

Figure 4: Distribution of commonly preferred sample size

Figure 5 includes the frequency of sample level selection in instructional technologies studies for the disabled. As understood from the figure, most of the study samples were taken at primary education level: 1-5 (f=12), 6-8 (f=9) and these numbers were followed by studies focused on university students;

undergraduate (f=12), postgraduate (f=2) and teachers: teacher (f=14), teaching staff (f=2). Managers, parents and pre-school groups were preferred less.

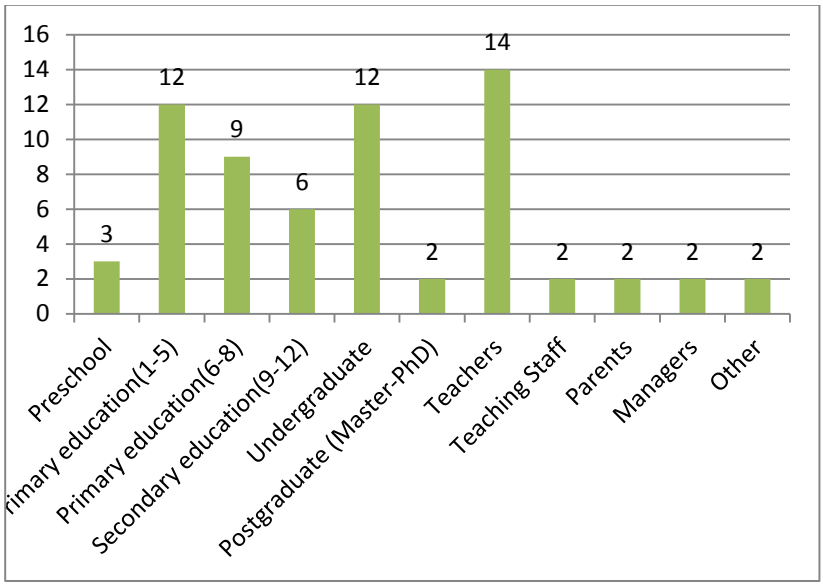

Figure 5: Frequency of sample level selection

According to Figure 6, the most commonly used method of sample selection is purposeful sampling, as by virtue of the field it must take its samples from people with disabilities.

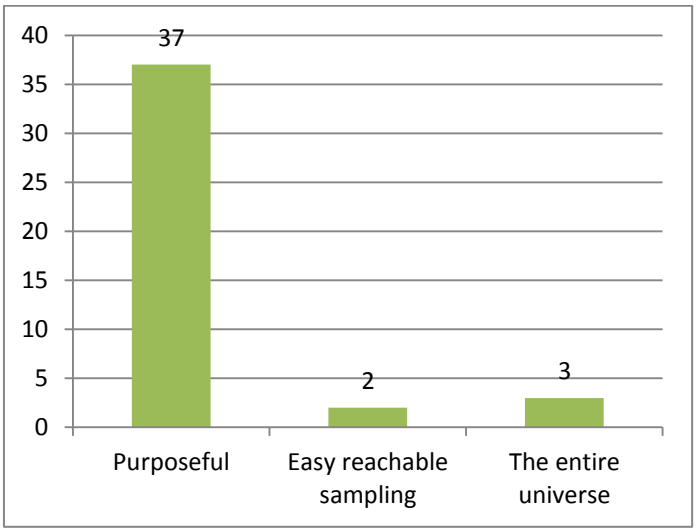

Figure 6: Usage frequency of sample selection methods

Discussion and Conclusion

In this study, the trends in educational technologies studies for the disabled individuals were investigated from various perspectives using a content analysis approach to survey scientific research articles in the field of instructional technologies for people with disabilities. As previously outlined in the literature review, after screening for research conducted by Turkish scientists in the Turkish context across national and international databases between the years 2007-2017, 57 studies were analyzed consisting of 49 articles, 22 proceedings and 1 book chapter, which could be accessed as full texts .

These articles were then subjected to a descriptive content analysis via using an "Article Classification Form". It was discovered that only 15 of 49 articles had been published on foreign journals although 36 of them had been released in English. Among all publications, only nine of them were within the scope of SSCI and eight of them were published in Turkey-addressed journals. There are very few studies on technology and practices that will enable disabled people to participate in educational settings.

The results show that research into educational technologies for the disabled mostly concentrated on the topics of learning environments, technology, design and development, and these contributed to improvement learning outcomes of the disabled. In the tendency study that Hew, Kale and Kim (2007) conducted, they determined that media study and instructional design approaches are the most discussed topics in the educational technology field. The current study found in the course of its survey that there has not been any research performed on the topics of teacher education, systematic change, research and theory, education and performance and distance education. This finding is consistent with the results of the research about trends in educational technologies in Turkey conducted by Göktaş et al. (2012). Increasing the number of quality research projects undertaken in these fields will contribute a lot to the engagement and achievement of the disabled in education.

We have seen that most of the studies on instructional technologies for the disabled focused on hearing and visually-impaired individuals as the sample populations, whereas an experimental (practical) research method was used more often when compared in terms of disability types, and these were followed by the frequent application of descriptive and action research models. It was determined that experimental study was conducted more for the hearing and mentally impaired groups, while action research was used for visually-impaired sample populations and screening studies were frequently favored when evaluating mixed disability groups. When performing a content analysis of their postgraduate thesis, Göker and Tekedere (2016) also found that more studies into e-learning and disability had been carried out when the subjects had visual and hearing impairments. In the course of the survey, it was revealed that no theoretical or occupational study had been undertaken and that the number of literature review and evaluation studies was very few. The most popular research approach in the field was quantitative, but there are a few mixed and literature review studies in which qualitative methods are used. Some of the research could not be classified into a particular method because they described only developed designs or introduction of projects. In the tendency determination research studies that had been performed via quantitative, qualitative and combined data gathering methods, it can be seen that exact experimental, quasi-experimental and scanning patterns were used (Alper and Gülbahar, 2009; Hew, Kale and Kim, 2007; Göktaş et al., 2012). Istenic, Starcic and Bagon's (2014) content analysis study concerning the field and researching the use of information and communication technology in special education found that descriptive and developmental methods were the favored tools when conducting research in this area.

Observation and interview were determined to have been used more often as data collection tools. Due to the low sample size of the disabled groups within the majority of the studies surveyed, we can say that it is often difficult to employ systematic data collection tools. This is a primary factor governing researchers' preference for using observation and interview tools for the mentioned groups. In their 2013 study Liu, Wu and Chen (2013) found that among research in to the use of instructional technology for disabled people carried out between 2008-2012, the most common research objective was to examine learning technologies and learning efficiency, and that data were collected primarily through experimental studies followed by interviews and surveys. Their findings suggested that more computer-aided technology work should be done in special education, and that research studies which take developmentally disabled students as their subject are more common than those concentrating on physically disabled students (Liu, Wu and Chen, 2013).

When research projects focusing on instructional technologies for the disabled were examined, it was concluded that descriptive analysis, one of the quantitative analysis methods (frequency, percentage, chart), and content analysis (as a qualitative data analysis method) were commonly preferred. Sözbilir et al. (2015) found that qualitative research patterns were frequently used in studies

on science education for the disabled, whereas quantitative tools, such as frequency and percentage tables and using central tendency measures as a data analysis method, and qualitative descriptive analysis methods were used more frequently than other analysis method.

It is clear that the number of the samples in instructional technologies researches was low (generally between 1-10), the majority of the sampling was purposeful, and the sample populations were commonly selected among students at primary education level, followed by undergraduate students and then teachers. Few studies focused on education managers, parents or preschoolers. When examined the literature, in the studies conducted was determined that the most preferable sample choice techniques are the ones which are easily accessible and which fit for the purpose (Akça-Üstündağ, 2009; Alper and Gülbahar, 2009; Şimşek et al., 2008, Göktaş et al., 2012). Göker and Tekedere (2016) declared that more than half of the target population of the topics studied in postgraduate theses were at primary education level; also Sözbilir, et al. (2015) stated that this population was the most studied and the sample size mainly ranged between 1-10 and 31-100 people. Istenic, Starcic and Bagon (2014) were in a study stated that this level was ranged between 1-10 and 11-50 people. The number in all sample populations is universally small, and proportionally will always be expected to be low in general as the subjects belong to disabled groups. Due to the fact that it was difficult to obtain verbal data from students with disabilities because of communication problems, learning difficulty etc., the data was collected via observation, and screening studies were performed rather with teachers and managers.

All the studies surveyed have investigated how information and communication technologies (ICT) and assistive technology (AT) can influence the education of students with special needs and they have shown that this technology can play an important and useful role (Adebisi, Liman and Longpoe, 2015).Furthermore, Istenic, Starcic and Bagon (2014) have offered suggestions for the future direction of ICT-supported learning, suggesting that further developments should be designed on the basis of universal design, providing accessibility and facilitating inclusion for all. They also advocate for the role of further research in supporting the implementation of truly inclusive learning environments, which cater both to students with special needs and to those without.

Finally, our survey highlighted that the number of studies conducted in Turkey in the field of instructional technologies for the disabled are inadequate, both in terms of number and quality. Therefore, the study concludes that it is important for future researchers in this field to be provided with project support, either from TUBITAK (the Scientific and Technological Research Council of Turkey) or from various national and international research bodies. Additionally, scientific project units at universities must priorities research on education and disability, offering incentives for academics to study these areas. The results of this work can act as a guide to practitioners and policymakers in the field of special education. Moreover, researchers planning to conduct future studies on this topic can also flesh out our understanding of the current situation with more qualified and comprehensive research. This study has been undertaken in order to aid policy-makers and field workers in terms of revealing both the strengths and the needs of the disabled populations in the context of interacting with instructional technology at the given time and serve as a guide for future work. In conclusion, in order to make lasting and effective changes for the disabled in education, interdisciplinary and improved communication across the disciplines is needed.

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Appendices

Name of the article	Author/S	Name of the journal	Year
Assistive technologies for college students with disabilities	İsmahan Arslan, Fethi A. İnan, Claire Thomas Ozel, Anita G. Wells	TOJET: The Turkish Online Journal of Educational Technology	2007
Evaluating audio books as supported course materials in distance education: the experiences of the blind learners	Aydin Ziya Özgür Huseyin Selçuk Kıray	TOJET: The Turkish Online Journal of Educational Technology	2007
Computer-assisted teaching and assessment of disabled students in higher education: the interface between academic standards and disability rights	Özcan Konur	Journal of Computer Assisted Learning	2007
Zihinsel yetersizliği olan öğrencilere okuma becerilerinin öğretiminde bilgisayar aracılığıyla sunulan eş zamanlı ipucuyla öğretimin etkililiği	Hakan Özak Hasan Avcıoğlu	Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi	2007
M-learning for hearing impaired learners: dimensions of evaluation	Cem Çuhadar H.Ferhan Odabaşı, Abdullah Kuzu	International Journal of Education and Information Technologies	2009
Opinions of teachers about computer aided mathematics education who work at special education centers	Murat Tezer Sezer Kanbul	Procedia Social and Behavioral Sciences 1 World Conference On Educational Sciences 2009	2009
Reflections of hearing impaired students on daily and instructional pda use	H. Ferhan Odabaşı, Abdullah Kuzu Cem Girgin, Cem Çuhadar, Mübin Kıyıcı, Tayfun Tanyeri	International Journal of Special Education	2009
Assistive technologies for students with disabilities: a survey of access and use in turkish universities	Ismahan Arslan Arı, Fethi Inan	TOJET: The Turkish Online Journal of Educational Technology	2010
Bilgi ve iletişim teknolojileri yoluyla özürlüler için geleceğe bir kapi açmak	Sıtkı YILDIZ	Uluslararası Sosyal Araştırmalar Dergisi	2010
Developing ict skills of visually impaired learners	Ömer Şimşek, Eralp Altun, Alev Ateş	Procedia Social and Behavioral Sciences	2010
The research about the usability of a visual dictionary developed for the hearing impaired students	Hasan Karal Lokman Şılbır	Procedia Social and Behavioral Sciences 9	2010
Görme engelliler için ses analizi ile e-posta iletimi	Nursel Yalçın, Ülkü Ülker	Bilişim Teknolojileri Dergisi,	2011
Library automation design for visually impaired people	Nilüfer Yurtay, Yücel Bicil, Sait Çelebi , Gülüzar Çit, Deniz Dural	TOJET: The Turkish Online Journal of Educational Technology:	2011
The factors that motivate and hinder the students with hearing impairment to use mobile technology	Abdullah Kuzu	TOJET: The Turkish Online Journal of Educational Technology	2011
Adaptive web-assisted learning system for students with specific learning disabilities: a needs analysis	Elif Polata Bahcesehir University Ozcan Erkan Akgun	Educational Sciences: Theory & Practice	2012

Görme engelli üniversite öğrencilerinin bilgi erişim sorunlari üzerine yapilmiş bir araştirma	Aynur Aydın	Bilgi Dünyası, 2012, 13 (1) 93-116	2012
Perceptions of computers and information and communication technology among regular and special needs teachers in cyprus	Zafer Bekiroğullari	Journal of Educational Sciences & Psychology	2012
Zihin engelliler sinif öğretmenlerinin araç-gereç kullanimina ilişkin görüşleri	Hasan Avcıoğlu	International Journal of New Trends İn Arts, Sports & Science Education	2012
Effectiveness of video modelling in training students with intellectual disabilities to greet people when they meet	Hasan Avcıoğlu	Educational Sciences: Theory & Practice	2013
Effects of computer-based instruction on teaching emergency telephone numbers to students with intellectual disability	Serife Yucesoy Ozkan Nuray Oncul Ozlem Kaya	Education and Training İn Autism and Developmental Disabiliti	2013
The vodie project: an extensive educational opportunity forvocational training of visually impaired individuals	A. Ergün Akgün M. Kemal Karaman	Procedia - Social and Behavioral Sciences 1179 – 1181	2013
Unobstructed access to information and communication technologies services: the case of turkey	Abdulkadir Özdemir, Abdullah Naralan, Ahmet İlker Akbaba	International Journal of Social Science	2013
Designing learning materials within the framework of the alis-t project: story telling activities for hearing impaired individuals	Yasemin Karal, Hasan Karal, A. Mevhibe Coşar, Taner Altun, Lokman Şılbır, Ekrem Bahçekapılı, Murat Atasoy, Mehmet Palancı	Turkish Online Journal of Qualitative Inquiry	2014
Development of mobile skill teaching software for parents of individuals with intellectual disability	Abdullah Kuzu, Atilla Cavkaytar, Hatice Ferhan Odabaşı, Suzan Duygu Erişti, Serkan Çankaya	Turkish Online Journal of Qualitative Inquiry, TOJQI	2014
Teacher use of instructional technology in a special education school for students with intellectual disabilities: a case study	Canan Sola Özgüç, Atilla Cavkaytar	Turkish Online Journal of Qualitative Inquiry	2014
Teaching chained tasks to students with intellectual disabilities by using video prompting in small group instruction	Çığıl Aykut, Deniz Dağseven Emecen, Eylem Dayı, Necdet Karasu	Educational Sciences: Theory & Practice	2014
Assistive technology and education laboratory for individuals with visual disabilities (getem)	Leyla Kanık	Qualitative and Quantitative Methods in Libraries	2014
An education portal for visually impaired	Nilüfer Yurtay, Yüksel Yurtay, M. Fatih Adak	Procedia - Social and Behavioral Sciences 171	2015

Işitme engelli bireylerin okuma - yazma ağitimin yönelik mobil uygulama geliştirilmesi: cümle düzenleme uygulamasi	Fatih Yaman, Onur Dönmez, Işıl Kabakçı Yurdakul	Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi	2015
Işitme engelliler okullarinda bilgi ve iletişim teknolojilerinin öğretim amaçli kullaniminin incelenmesi1	Uygar Bayrakdar, Cem Çuhadar	Trakya Üniversitesi Eğitim Fakültesi Dergisi	2015
Teaching to intellectual disability individuals the shopping skill through ipad	Salih Çakmak Sibel Çakmak	European Journal of Educational Research	2015
The effectiveness and usability of the educational software on concept education for young children with impaired hearing	Hanife Göker Latife Özaydın Hakan Tekdere	Eurasia Journal of Mathematics, Science & Technology Education,	2016
Engellilere yönelik e-öğrenme ortamlari konusunda yapilan lisansüstü tez çalişmalarinin içerik analizi	Hanife Göker Hakan Tekdere	Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi	2016
Işitme engelliler için mobil uygulama geliştirme süreci: çarkifelek örneği	Onur Dönmez, Fatih Yaman, Y. Levent Şahin, Işıl Kabakçı Yurdakul	EĞİTİM TEKNOLOJİSİ Kuram Ve Uygulama	2016
Observation of multimedia-assisted instruction in the listening skills of students with mild mental deficiency	Erhan Akın	Educational Research and Reviews	2016
Opportunities for students with disabilities in higher education institutions in turkey: where is ict?	A.Aşkım Kurt, Canan Çolak, Pelin Dönmez, Ozan Filiz, Fatih Türkan, H.Ferhan Odabaşı	International Journal of Special Education	2016
The combined use of video modeling and social stories in teaching social skills for individuals withintellectual disability	Seray Olçay Gül	Educational Sciences: Theory & Practice	2016
Designing a web-based interactive audio library automation system for visually-impaired people and evaluation of its usability	Aslıhan Tufekci Yahya Balaman Utku Kose	Journal of Multidisciplinary Developments.	2016
Işitme yetersizliği olan öğrencilerin eğitimlerinde bilgisayar destekli kelime öğretim materyali kullaniminin incelenmesi	Hacer Keser Oğuzhan Özdemir	Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi	2017
Matematik öğretimi için nokta belirleme tekniğine dayali bir mobil uygulama	Eren Deniz Genç, Hilal Nur Issi, Oktay Yıldız	Istanbul Journal of Innovation in Education	2017
Görme engelli ve az gören bireyler için geliştirilen donanim ve yazilimlar	Mustafa Tevfik Hebebci	Bilim, Eğitim, Sanat ve Teknoloji Dergisi (BEST Dergi)	2017
Design and use of interactive social stories for children with autism spectrum disorder	Sunagul Sani-Bozkurt Sezgin Vuran Yavuz Akbulut	Contemporary Educational Technology	2017
Students with special educational needs and assistive technologies: a literature	Raziye Erdem	The Turkish Online Journal of Educational Technology	2017
Effectiveness of teaching cafe´ waitering to adults with	Atilla Cavkaytar Ahmet Turan Acungil Gözde Tomris	Education and Training in Autism and Developmental Disabilities	2017

Investigating interactions between students with mild mental	Durmuş Özdemir Selçuk Karaman	Education and Science	2017
The effectiveness of the smart board-based small-group graduated guidance instruction on digital gaming and observational learning skills of children with autism spectrum disorder	Melih Cattik Serhat Odluyurt	Turkish Online Journal of Educational Technology - TOJET	2017
Evaluation of a university website's usability for visually impaired students	Emrah Soykan Fezile Özdamlı	EURASIA Journal of Mathematics Science and Technology Education	2017
Examining the effectiveness of the in-service training program on web 2.0 tools for the special education teachers.	Sabiha Yeni	Electronic Turkish Studies .	2017

Papers and book chapters	**Author/S**	**Name Of The Event**	**Year**
Görme engelliler için yeni bir arayüz tasarimi	Sevinç Ay Asaf Varol	Ulusal Teknik Eğitim, Mühendislik Ve Eğitim Bilimleri Genç Araştırmacılar Sempozyumu	2007
Görme engelli öğrenciler için bilişim	Emiroğlu G. Bülent	Akademik Bilişim	2008
Işitme engelli bireylerin eğitim sürecinde bilgisayar destekli animasyonlardan yararlanma	Hasan Karal Erhan Çiftçi	The International Educational Technology Conference (Ietc)	2008
Mobile technologies for students with hearing disability (IBEM).	Girgin, M. C. Kıyıcı, M, Tanyeri, T.	5th Pan-Common Wealth Forum On Open Learning	2008
Computer aided education and training tool for hearing impaired children: AURIS	Gamze Sarmaşık, Bülent Şerbetçioğlu, Alp Kut	Conference Icl2009	2009
Forming text in pdas for special education students	Ümit Girgin, Ferhan Odabaşı Cem Girgin	Proceedings Of The 8th Wseas Int. Conf. On Electronics, Hardware, Wireless And Optical Communications	2009
Higher education provision for the hearing impaired and internet based education in anadolu university-anapod	M. Cem Girgin Hakan Şenel	Proceedings Of The 8th Wseas Int. Conf. On Electronics, Hardware, Wireless And Optical Communications	2009
Işitme engelli bireylerin türkçe'de ek kullanabilme becerilerini geliştirmeye yönelik öğrenme ortami tasarimi	Hasan Karal Lokman Şılbır Nurşen Küçüksüleyman	9th International Educational Technology Conference, Ankara, Turkey	2009
Use of technology as a solution to the problems faced in by the teachers of the hearing impaired literacy education: ISITEK project	Umit Girgin, Ahmet Naci Coklar, A. Aşkım Kurt, H. Ferhan Odabaşı	Recent Advances İn Applied Mathematics And Computational And Informatıon Sciences	2009
Bir yüksek öğretim uzaktan eğitim programının görme engellilerin kullanimi açısından değerlendirilmesi: GÜUEP örneği	Ufuk Tanyeri Aslıhan Tüfekçi	International Conference On New Trends İn Education And Their Implications	2010

Examining the integration of icts for hearing impaired youths	Sema Unluer Isıl Kabakçı, Yıldız Uzuner	Program Of 2nd International Congress On Deafness: Advances İn Oral Modality,	2010
General review on computer literacy of visually handicapped individuals in turkey	Şafak Bayır Hafize Keser Gülcan Numanoğlu	World Conference On Learning, Teaching And Administration Papers	2010
Görme engelli öğrencilerin bağımsız hareketbecerisi etkinliklerinde kullanilmak üzere geliştirilen ses ile görme destekli bir eğitim yazılımı	Abdullah Kuzu Ferhan Odabaşı Levent Şahin Özgür Dursun	Iıı. Uluslararası Türkiye Eğitim Araştırmaları Kongresi	2011
Reading of Turkish e-book for visually impaired	Nilüfer Yurtay, Yücel Bicil, Sait Çelebi, Ayşe Bilge Gündüz , Yüksel Yurtay , Ufuk Çelik	11. International Educational Technology Conference,	2011
Görme engelliler için sesli bilgisayar klavyesi	Metin Kapıdere, Onur Babür	Akademik Bilişim	2013
Türkiye'de özel eğitimde yardimci teknoloji kullaniminin önündeki zorluklar	Necdet Karasu, Elmas Gülcan, Kürşat Çağıltay, Göknur Kaplan Akıllı, Hasan Çakır	V. Uluslararası Türkiye Eğitim Araştırmaları Kongresi	2013
Hareket yakalama teknolojisiyle türk işaret dili animasyonu	Arda Söylev Engin Mendi	IEEE 22nd Signal Processing And Communications Applications Conference	2014
Mobil okur: görme engelliler için türkçe yazi okuma sistemi	Hilal Kandemir Büşra Cantürk Muhammet Baştan	IEEE 24th Signal Processing And Communications Applications Conference	2016
Developing a gesture-based game for mentally disabled people to teach basic life skills	Mohammad Javad Nazirzadeh, Kürşat Çağıltay, Necdet Karasu	International Conference Educational Technologies	2017
Providing individual knowledge from students with autism and mild mental disability using computer interface	N. Tuğbagül Altan Akın Mehmet Göktürk	International Conference On Applied Human Factors And Ergonomics	2017
An interactive web-based circuit design and analysis interface for disabled students by using speech recognition technology	Ayse Yayla Hayriye Korkmaz Ali Buldu	2017 IEEE Global Engineering Education Conference (Educon)	2017
Technology and the changing nature of 21st century education: how to make technology work for people with disabilities	Buket Akkoyunlu	M.Allegra, M.Arrigo, V.Dal Grande, P.Denaro, D.La Guardia, S.Ottaviano, G.Todaro (Ed). Mobile Learning For Visually İmpaired People. (64 - 71).Consiglio Nazionale Dele Ricerche - Istituto Per Le Tecnologie Didattiche.	2012