Disabled People and E-Inclusion
Abstract

The fast developing technologies can benefit disabled people from many ways. However, it also formed new gap to them and caused their lives to be marginalized by the digital society. The purpose of this research was to find out issues and problems disabled people meet in the e-Society.

A literature study was conducted as the research method by trying to follow the principles of systematic literature review method. 51 articles were collected from the online publication database to support this research.

The results found out that the reasons caused the exclusion of disabled people are because of the issues of affordability, impairments of disabled people and social phenomenon. The price of mainstream technologies in the market is not affordable to the majority number of disabled people since the low employment rate and low income level keep most of them living in poverty. On one hand, the impairments of disabled people not only affect their lives and works, but also limited their ability to have the access to various technologies. On the other hand, the design of technologies has not fully covered the needs of disabled users, which causes many challenges and problems during the experiment of technologies. Moreover, due to the average low level of education, disabled people are lacking of technical knowledge in how to use ICT, especially in the group of female and senior people with disabilities.

The most important finding in this research paper demonstrates that more than half of the articles mentioned the issue of lacking awareness in disabled people. The situation of exclusion of disabled people in today’s digital world can be changed if the whole society could pay more attention to their challenges and problems.

Keywords
Disabled people, people with disabilities, disability, inclusion, exclusion, e-inclusion, digital divide, disabled divide, problem, challenge

Supervisor
Adjunct professor and university lecturer Mrs, Raija Halonen
Foreword

This thesis is not only for organizations, communities or industries to consider the challenges of disabled people, but for every individual of us to understand the issues and problems of disabled people’s lives in this digital world.

I would like to thank my supervisor Raija Halonen, who has been very supportive during the whole thesis-writing period.

Siqi Fu

Oulu, March 23, 2015
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1. Introduction

Information technology plays an essential role in today’s modern society. People more and more get use to receiving and sending information via the Internet, and handling works as well as their social life online. The e-Society strongly improved people’s way of living, especially it has brought a lot of benefits to people with disabilities.

1.1 Purpose and motivation

The purpose of this research was to set a closer step to reach e-Inclusion to people with disabilities, so it is important to form a literature study and understand the obstacles disabled people have in today’s digital world. This research indicates the issues and problems that disabled people are facing in the e-Society.

Due to the lack of research and investigation in people with disabilities, organization, communities, companies, developers and manufacturers do not have a shared understanding of disabled people’s lives in today’s society. There are a number of research papers present the ideas or development processes in different kinds of applications, devices or software, and try to assist the lives of people with disabilities. However, there are not too many research papers, which investigate the challenges of disabled people’s lives in the digital society or reveal the problems of digital exclusion in this vulnerable group.

In this thesis author’s opinion, the development of assistant technologies is one of the solutions to help disabled people. But, there are many issues and problems the society has ignored when they are trying to push various technologies into the market. It is important to let the whole society have a shared understanding of disabled people, and try to provide more effective and efficient support to them. The motivation of this research paper was to find out the issues and problems of disabled people in the e-Society, and also try to conduct valuable research results and motives for further research and development.

1.2 Prior research

Every one out of five people in the world is suffering physical disability, especially in developing countries. Based on the U.S Census Bureau’s statistical report. In the year of 2000, there were 49,7 million of people including children, adults and elders were experiencing different levels of physical disadvantages or disabilities (Waldrop & Stern, 2003). Ten years later, in the year 2010, the number of people with disabilities increased up to 56,7 million, which was about 18,7% of the whole U.S population (Brault, 2012). This growing trend does not only happen in the U.S, but also in the whole world. The World Bank indicated the issue in their report in 2011 that, the actual number of disabled people is much higher than what has been collected so far (Durocher et al., 2012).

In order to identify the number of people with disabilities, the U.S Census Bureau (2012) clearly defines the concept of disability into six categories: vision difficulty; hearing difficulty; cognitive difficulty; ambulatory difficulty; self-care difficulty and
independent living difficulty. As shown in Figure 1, there are 30.6 million of people have the difficulties in walking or climbing stairs, and 3.6 million of them is living with the help of wheelchairs. 8.1 million of disabled people have seeing difficulty and 7.6 million of them have hearing disability. The second largest population from the figure shows 12 million of disabled people need help from other people for their daily tasks. Cognitive difficulty as the least proportion of all those disabilities have around 2.4 million of them, which is still a large number (Brault, 2012).

![Difficulty walking/ climbing stairs](chart)

**Figure 1.** The number of different disabilities in the U.S. (Brault, 2012).

Disability can be formed congenitally from birth due to medical afflictions during the gestation period or acquired from the war or accidents, and also by naturally aging (Durocher et al., 2012). Luckily in today’s medical area, there are assistive equipment and technologies available to help disabled people through the disadvantages caused by their disabilities. But as they define disabilities are separated into two models, which are medical and social model. Medical model refers to the disability associated with their impairments, which formed the physical challenges to their lives. As in the social model, disabled people are impacted by the social trend because they do not have the equal access to socializing with the society like the rest of the people in the world. In other words, it is the society, who has formed the gap between disabled and non-disabled people (Palmer & Harley, 2011).

From the first release of World Wide Web to the invention of the network, until now the creations of Graphical User Interface design. The bursting of the Internet and technologies has totally reformed people’s way of living. However, for many developing countries, it takes longer time for them to use and absorb new technologies into their daily life because of the poor economic issue. Even in developed countries such as the U.S., Australia, and EU countries, the development of information technology has gone far ahead compared to the rest of the world, since they also need to face unequal spreading of technology between city and rural area (Norris, 2001).

Digital divide separates people based on the different level of education, monthly earning, ethnic groups, ages and health conditions. Many countries such as Finland, Sweden, Canada and Germany organized several program and communities in order to reach e-Inclusion. They have settled up public libraries, free training centres, education facilities and financial assistances to people with disabilities (Norris, 2001).

The support from governments may ease the issue of unbalanced spreading of technologies in developed countries. But for governments in developing countries is not wealthy enough to consider the importance of technologies, since there are still struggling about food and living expenses. The gap can also cause the fast developing speed. After the war in Sri Lanka, their government decided to adopt ICT to chasing up the steps of developing country. So in nearly one decade, the ICT literacy rate climbed
from 8% in 2005 up to 40% in 2013. The fast increasing ICT adoption rate has divided poor and disabled people from the society (Wedasinghe & Wicramaarchchi, 2014).

1.3 Research question and research method

This research focused on finding out the problems and issues disabled people meet in the e-Society. A literature research study was conducted by trying to follow the rules of systematic literature review method.

![Figure 2. Research process.](image)

In this research paper, the process started by picking up keywords and keyword combinations, which are most related to the research topic. And then, the articles were selected by using those keywords and keyword combinations. After several rounds of inclusion and exclusion decision-making based on the rules of review protocol, the selected articles were reviewed. Articles were analyzed by separating the article content into different themes in order to discuss and demonstrate the research results for this paper (see Fig. 2).

1.4 Main contribution

The study found out that the impairment of disabled people is one of the reasons caused the problems from getting access to the digital society. Those problems are, for example, limitation by their disabilities, difficult to have a job, low incomes and lack of technical knowledge, and lack of awareness of the importance of ICT.

Nevertheless, the most popular discussed issue from articles is the lack of social awareness of disabled people. Governments play the essential role to advocate communities, organizations, industries and manufacturers to take people with disabilities into account. Even though there are relevant regulations, legislations and rules established for disabled people to help them have the equal rights as the rest of the people in the world, it is still not sufficient and well enough. Technologies are developed and designed for the majority people but ignored to provide equal access to disabled people. Although there are technologies designed especially for disabled users, the issues of incompatibility and complex to use have frustrated and scared disabled people away from keeping use ICT or assistive technologies.

1.5 Thesis structure

Chapter two introduces the research approach used in this research paper. The research question is illustrated at the beginning of this chapter. It indicates the core issue this thesis discusses. And then, systematic literature review method is explained by providing the basic concepts of this method and how this method was used in this research paper.

Chapter three, as the main body part of this thesis, demonstrates the content analysis process with 51 selected articles. During the review phase, articles were organized into different theme groups based on the issues and problems those articles found out. There
are three themes in this chapter: the affordability issue, the accessibility challenges to disabled people, and the problems caused by social phenomenon.

Chapter four demonstrates the findings from the literature study, which are also the research results in this thesis. The findings are concluded to answer the question of this research.

Chapter five is the final chapter, which summarizes the whole content of the thesis. Limitations, suggested solutions and recommendations for further research are also discussed in this chapter.
2. Research Approach

The research is not only aiming to discover unknown field, but also to confirm the existed knowledge or phenomenon by studying previous research papers. The purpose is to catch people’s attention to those ignored or less cared issues and problems. It is important for a research paper to have a well-defined research question and carefully selected research method since it can affect the quality of the research and the accuracy of research results (Goddard & Melville, 2001). This chapter explains the research problem and method used in this study.

2.1 Research method

In order to find out the obstacles that prevent disabled people using ICT, a research question was presented: What kind of issues and problems do disabled people meet in the e-Society? This research was conducted with a literature study, and all the process used was trying to follow the steps of systematic literature review method.

“Undertaking a review of the literature to provide the best evidence for informing policy and practice in any discipline, is a key research objective for the respective academic and practitioner communities” (Tranfield et al., 2003, p.207). Literature study is one of the research methodologies, which can support academic needs. It can provide strong fundamental knowledge for researchers to get familiar with the research areas such as by understanding the concepts of technical terms and the social phenomenon, or to collect resource from the exist research papers (Webster & Watson, 2002).

There are many research papers available concerning new innovation or ideally design solutions for disabled people. However, very few amount of research focus on discovering the issues and problems when disabled people try to use them. So, in this research paper, a comprehensive literature study about disabled people’s challenges in the digital world were conducted, and the issues that the society has ignored are pointed out.

2.2 Systematic literature review

Systematic literature review research method was first designed for medical practices use, since there is a huge amount of data in medical research that is difficult to organize and seek for results. But with the help of this method, it makes medical practices easier to conduct findings for medical research (Mulrow, 1994).

Ramey and Rao (2011) explain the definition as “The systematic literature review was intended to improve the process by synthesizing research in a transparent and reproducible way to support evidence-based decision-making” (p.1), and they indicate “One important goal of the systematic literature review was to draw conclusion on the best evidence available” (p.2). Due to the features of systematic, transparent and reproducible of systematic literature review, researchers can conduct more comprehensive and reliable findings across different areas to fulfill the research needs. It helps researchers on decision-making and also formulate principles in order to efficiently using various resources to support their research results (Ramey & Rao,
This research paper discusses issues and problems between disabled people and the use of technologies, which covers many fields of study such as medical science, information technology, and social science. So, the characteristics of systematic literature review research method can bridge knowledge from different fields together in order to reach the goal of the research.

Some of the literature review studies require wide scope research or the literature contain fractional contents and less ordered information. These can cause unfinished research or failures. Because the research process gets frustrated, and the researchers may lose motivations after being tolerated by the unpleasure procedures (Ramey & Rao, 2011).

In recent years, many researchers prefer to follow or adopt this research method into their field of studies due to the reason of the advantages of this method. Its focuses on planning, searching and organizing research resources without any boundaries, and it capable of providing a sufficient way to delivery high-quality research results than other literature studies (Ramey & Rao, 2011). Moreover, it bridges the gap of previous researches and gives more reliable and valuable results for further research (Kitchenham & Charters, 2007).

2.3 Research procedures

Based on the research conducted by Tranfield, Denyer and Smart (2003) about using systematic literature review on evidence-informed management knowledge. They advocate three stages to support their research, which are making plan for the review, conducting the review as it planned and reported findings for dissemination. They demonstrate a list of more detailed process for systematic literature review as it shown in Figure 3.

![Figure 3. Nine phases in systematic literature review process (as cited in Tranfield et al., 2003, p.214).](image)

Ramey and Rao (2011) followed those three main stages on their research study about the use of mobile phone with non- or semi-literate people. In their research paper, they selected six phases among ten to support systematic literature review process. Those phases are: develop review protocol, select databases, create search terms, define inclusion or exclusion criteria, characterize corpus and finally synthesize the findings (see Fig.4).
Develop review protocol  Select databases  Create search terms

Synthesize the findings  Characterize the corpus  Define inclusion/exclusion criteria

Figure 4. Systematic literature review procedures (Ramey & Rao, 2011).

Either to follow the full process with ten phases completely or to choose the most handful phases to support the researcher’s field of study. There are all recommended as long as to complete the research process with final results that are rigor enough (Ramey & Rao, 2011). In this research paper, the literature study was conducted by trying to follow those six phases, which are recommended by Ramey and Rao (2011) since the research region and topic they were involved with was very close to what this research paper were dealing with.

In this research paper, the research process started by developing review protocol for collecting resource to the research. The review protocol is the standard regarding how to perform searches on the databases, what kind of search terms or keywords should use when search in the databases, and which principles should follow when selecting articles from a long list of research results. The protocol is an iterative development process. And the rules can always adjust when it needs to since the goal is to find out as many relevant articles as possible to complete the article collection process (Ramey & Rao, 2011; Tranfield et al., 2003). As the research question in this research paper was already well-defined, the research target and goal are clear. It focused on figuring out the issues and problems that disabled people meet in the e-Society.

In order to test whether the database is the suitable one for this research study, keywords “disability” and “disabled” were listed for helping retrieve articles. IEEE Xplore was first selected as the database for testing since it is the largest professional association with a huge number of publications on technology and education. Thousands of items were detected after search by those keywords. However, after a glance through article title, almost all of them were research articles about innovations in assistive products or technologies for people with disabilities. Keywords “disabled problem” and “disabled challenge” were tried afterward as to see if there are any related research articles. The results showed negative outcomes since rarely of the articles mentioned problems or issues that disabled people may have with ICT. Only from some background studies showed a little evidence of challenges of technologies to disabled people. Same keywords were tested in ACM Digital Library, but the results were the same.

The database selection problem was solved by tracking back some articles’ reference list and digging out the databases where relevant resource was cited from. So, Taylor and Francis Online was decided as the target database to collect resource for this research paper. It is a powerful online library with high-quality and up-to-date journal articles. And more importantly, the keywords test retrieved many articles, which fulfill the needs and goal for this research study.
The next phase was to create a list of keywords or terms that can help to find articles as relevant as possible. To make sure every detected article discusses issues about people with disabilities, the words “disabled”, “disabled people” and “disability” were defined as the key items, so at least one of them was included in the searching process. And also, it is important to know the connection between disabled people and ICT, so keywords “ICT”, “technology” and “disabled with ICT” were listed. Keywords “disabled divide”, “inclusion”, “exclusion”, “challenge”, “problem” and “difficulty” were written into the list, in order to make sure the detected articles discuss the problems and issues of disabled people.

After a couple of times search with those keywords, the number of retrieved articles was huge. So, in order to downsize the quantity of the articles, the advanced search function was used to pass those unqualified ones. And then, put more information or keyword combinations into search criteria to make sure the quality of the articles. The search was limited to: journal article publication type; time range from 2004 to present; have full access to the content; cover all subject areas; and also the search criteria with keywords combination in document title, abstract, article keywords and full text (see Table 1). As the purpose of search articles in a wide range, the articles were searched from the database through all subject areas such as behavioral sciences, bioscience, communication studies, computer science, economics, education, physical sciences and social sciences.

The lists of article searched from different criteria were saved in printing mode as PDF files with article titles, journal names, and published times. After many rounds of search, 448 articles were retrieved. There were a lot of repetition articles when similar search terms or keywords were used. For example, “disabled”, “inclusion” and “exclusion” were used twice as the keywords but the search terms used in other criterias were different.

<table>
<thead>
<tr>
<th>Article title</th>
<th>Search everything</th>
<th>Abstract</th>
<th>Keywords</th>
<th>Advanced search criteria</th>
<th>Search results</th>
</tr>
</thead>
<tbody>
<tr>
<td>“disabled”</td>
<td>-</td>
<td>-</td>
<td>“inclusion”</td>
<td>- journal article publication type</td>
<td>172</td>
</tr>
<tr>
<td>“disabled”</td>
<td>-</td>
<td>-</td>
<td>“ICT”</td>
<td>- time range from 2004 to present</td>
<td>2</td>
</tr>
<tr>
<td>“disabled”</td>
<td>-</td>
<td>-</td>
<td>“divide”</td>
<td>- have full access to the content</td>
<td>6</td>
</tr>
<tr>
<td>“disabled”</td>
<td>“ICT”</td>
<td>-</td>
<td>-</td>
<td>- Cover all subject areas</td>
<td>7</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>“disabled”</td>
<td>“ICT”</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>“disabled”</td>
<td>“challenge”</td>
<td>“challenge”</td>
<td>“disabled”</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>“disabled”</td>
<td>-</td>
<td>-</td>
<td>“exclusion”</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>“disability”</td>
<td>“challenge”</td>
<td>-</td>
<td>“inclusion”</td>
<td></td>
<td>143</td>
</tr>
<tr>
<td>“disability”</td>
<td>“challenge”</td>
<td>-</td>
<td>“exclusion”</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td><strong>Total results</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>448</strong></td>
</tr>
</tbody>
</table>
At the first step of article selection, all the duplicated articles were removed. It was done by using the author’s last name as the research item and let it went through the list of articles from the PDF files, and then removed the articles with same article title away from the list. There were 235 duplicated articles have been left out, and remained 213 unique articles at this stage.

At the second step of article selection, the inclusion criteria have defined in order to remove the irrelevant articles among those 213 articles. It first started by glancing article titles in inverted order because from the list of detected articles, the most relevant articles were automatically listed in front of the list. So, review the article titles started from the end of the list were easier to remove the least relevant articles. 128 articles were excluded in this step based on the information from the titles.

At the third step of article selection, those 85 remained articles were reviewed from abstracts to content. And the article inclusion criteria was based on a list of questions (see Appendix A) and the review protocols. The review protocols defined as: First, the article contains literature study about disabled people, and it discusses at least two challenges that disabled people have. Second, it must have at least one reason about why people with disabilities have marginalized by today’s society. Third, it must have standard research process from data collection to data analysis or a literature study, and the final results should contain the evidence about disabled people's challenges when using ICT or assistive technologies. For those articles, which cannot fulfill these inclusion criteria were excluded, and there were 63 articles survived in this step. At last, 51 articles were used in this research paper.

A conceptual framework was designed for this literature review study. Jabareen (2009) defines a conceptual framework as a network, which connects to different concepts in the research. It can provide an overview understanding of the phenomenon, which in a way to support different research studies.

![Diagram](image)

**Figure 5. Literature study framework.**

Figure 5 demonstrates the framework used in this research paper. Three concepts were used to help find out the answers to this research. There are: understanding the limitation caused by disabled people's disabilities to prevent equal access to technologies; disabled people’s knowledge and awareness about ICT; the social phenomenon affect disabled people’s accessibility and feelings about ICT. These three concepts help to understand problems and issues prevent disabled people using ICT from different aspects, which make this research study more comprehensive and more reliable.
3. Literature Study

Technologies have brought significant improvements to people’s life as well as to those people who are living with disabilities. There is great difference in the outcome of disabled people life with the help of Information and Communications Technologies (ICT) compare to those without. The use of ICT plays an important role to bridge the digital divide between disabled people and non-disabled people, since ICT provides the opportunities for disabled people to enhance their lives (Doh & Stough, 2010). It has been reported that disabled people live in higher quality of life than what non-disabled people have expected (Albrecht & Devlieger, 1999). However, this paradox has explained later that the life quality data of disabled people from that report was not reliable. The study shown that only the disabled people who can control and manage their daily life are capable of manage their lives in a better way because they know how to seek knowledge and ask for help. More importantly, they can socialize with all kinds of communities (Albrecht & Devlieger, 1999). It is crucial to let the whole society understand what are the real obstacles prevent disabled people to use ICT equally. In this chapter, it shows the literature study about the problems and issues that disabled people meet when living in the e-Society.

This literature review study was conducted with the 51 articles that were selected for this research paper. The review process has done by following the ideas from the framework. In this chapter, articles were sorted into different groups based on the themes they have discussed. And it has shown that inside many individual articles, it discusses several issues and problems about disabled people in today’s society. So, in this situation, the same article was listed into many different themes.

3.1 Affordability of ICT for disabled people

From the literature study, it shows three factors that cause the issue of affordability challenge to disabled people, which are: the expensive price of high-technology products, the poor employment situation, and the additional expenses.

3.1.1 Expensive ICT costs

A statistical study demonstrates that the number of people who can afford the computer and the Internet access shows huge differences between disabled people and non-disabled people. As shown in the research, around 25% of disabled adults own the computer, and within this percentage only 20% have the Internet access. Compare to the non-disabled adults, there are 66% of them own the computer, and 40% have the access to the Internet (Kaye H. S., 2000).

According to the disability status report in the U.S. conducted by Waldrop and Stern (2003), nearly 8.7 million disabled people are living in poverty, and the data shows an increasing trend in the future. The ratio of annual household incomes reveals that people with disabilities earn three times less than those people without disabilities. Although, some local communities provide financial allowance to help people with disabilities, it is still not enough for them to afford the price of ICT. In the U.S., less than half of disabled people receive financial assistance every year. And, computers, mobile devices
or some other technologies are normally not in the list of supportive items (Baker & Bellordre, 2004).

There are 9 articles indicate that, disabled people have been excluded from the society because the price of ICT is too costly, and most of the disabled people are not capable of affording it. In those articles, many authors state the high cost of ICT products and services are, for example, computers, the Internet access, mobile phones as well as assistive technologies for disabled people. Due to the financial factor of disabled people, the price of ICT is one of the obstacles that prevent disabled people to use those technologies.

Table 2. Articles indicate disabled people choose not to use ICT because of the high price.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(D'Aubin, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>In Canada, there are barriers exist among people with disabilities when concerning the accessibility issue on ICT. The author believes it is important to enhance their policy and legislation in order to support the inclusion of disabled people. This article discusses disabled people are facing economic challenge and also challenges from the society.</td>
</tr>
<tr>
<td>(Vicente &amp; López, 2010)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article finds out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation in using ICT.</td>
</tr>
<tr>
<td>(Watling &amp; Crawford, 2010)</td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Literature study</td>
<td>The society has failed to recognize the different needs of disabled people. This article advocates the solution for digital exclusion should emphasize to the improvement of digital policy and practice.</td>
</tr>
<tr>
<td>(Tsaliki &amp; Kontogianni, 2014)</td>
<td>Journal article - Journal of Children and Media</td>
<td>Survey</td>
<td>The authors argue that the exclusion of disabled people from the digital society can be affected by their limitations from impairment and incomes disadvantage, but the most important factor is due to the lack of awareness by the society.</td>
</tr>
</tbody>
</table>

As the articles shown in Table 2, one of the articles indicates that, although some of the disabled people have the computer at home, they are using outdated software and operating system because the price of those technologies is unaffordable for them (D'Aubin, 2007). In the research paper of Vicente and López (2010) also point out the affordability issue of disabled people. They found out that more than half of the disabled people choose to not have the Internet connection at home, only because of the Internet service fee is too expensive. The survey study in Greece indicates that ignore the accessibility issue from disabled people’s impairments, some of the disabled people own the computer only for offline games because their economic situation could not allow them to pay the Internet connection fee (Tsaliki & Kontogianni, 2014). The expensive price of the high-technical products and services block the way from disabled people to getting access and take advantages from those technologies (Watling & Crawford, 2010).
**Table 3.** List of articles discusses the high price of ICT.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Doh &amp; Stough, 2010)</td>
<td>Journal article - International Review of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower usage of ICT compare to non-disabled people, and the number of ICT usages has no connection to the usefulness of technologies for disabled people.</td>
</tr>
<tr>
<td>(Harris, 2010)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Literature study</td>
<td>Disabled people are willing to use high-technical devices, however, nowadays they stopped purchasing technical products because of the expensive cost and complex to use. The article advocates technical products for disabled people should accessible for them.</td>
</tr>
<tr>
<td>(Mokiwa &amp; Phasha, 2012)</td>
<td>Journal article - Africa Education Review</td>
<td>Interview</td>
<td>This study shows the usage of ICT in disabled people does not always show positive outcomes, especially for users with visual disability. The author found out the reasons, which are because of unsuitable design, the limitation of visual disability, lack of communication and the unaffordable price of ICT.</td>
</tr>
<tr>
<td>(Chitranshi &amp; Yadav, 2014)</td>
<td>Conference - 2014 5th International Conference- Confluence The Next Generation Information Technology Summit (Confluence)</td>
<td>Literature study</td>
<td>This study compares assistive technologies from the past and makes the prediction about the future trend of technology for disabled people. It points out the high cost of assistive technology is still the issues for the disabled community.</td>
</tr>
<tr>
<td>(Wedasinghe &amp; Wicramaarchchi, 2014)</td>
<td>Conference - Electrical Engineering and Information &amp; Communication Technology (ICCEEICT) 2014</td>
<td>Literature study &amp; interview</td>
<td>The society has not aware the needs of people with different disabilities. This article discusses the barrier and difficulties of disabled people with the accessibility issue of ICT. They found out that ICT does not bring as many benefits as it brings to non-disabled people.</td>
</tr>
</tbody>
</table>

People with disabilities could not afford the costs of ICT makes them have less access to the Internet and technologies (see Table 3). “…There is a significant disparity in the outcome of this process between ethnic minorities and economically disadvantaged people who lack ICT access and usage and those who have no such disadvantages. This phenomenon creates serious social inequalities” (Doh & Stough, 2010, p. 53). Even though, Harris (2010) claim there are advanced technology fundings for disabled people in the U.K but it is only for those who is studying in the university or being employed by a company. Because those related fundings are only available for students and employees, which are supported by education communities and companies. The unaffordable mainstream technologies limited the choice from disabled people. The high cost of ICT is an issue that need to be addressed in order to provide more opportunities for working and learning purposes (Mokiwa & Phasha, 2012). Wedasinghe and Wicramaarchchi (2014) agree that the cost of computers and Internet connection services are too much for disabled people, especially for those living in developing countries. Moreover, for some of the disabled people, they need to use assistive technology to support their performance with the computer. However, most of
the assistive technologies are marked with a high price, which disabled people cannot afford (Chitranshi & Yadav, 2014).

The cost of ICT and assistive technologies are normally quite expensive to people with disabilities, so, some of the disabled people choose to not buy and use technologies just because they think the price of the technologies is too much for them.

3.1.2 Employment issue with disabled people

There are 11 articles discuss the employment issue about people with disabilities. The main reason for most of the disabled people living in poverty is because they have difficulties to obtain jobs. The employment issue is the starting point that affects the usage of technologies among them. Companies, organizations, and industries prefer to hire employees that are capable of managing their work efficiently instead of having the employees with disability challenges when at work.

Table 4. List of articles discusses employment situation to disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Malakpa, 2007)</td>
<td>Journal article - International journal of special education</td>
<td>Survey</td>
<td>The study indicates the employment situation is even more difficult for people with visual disability.</td>
</tr>
<tr>
<td>(D'Aubin, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>In Canada, there are barriers exist among people with disabilities when concerning the accessibility issue on ICT. The author believes it is important to enhance their policy and legislation in order to support the inclusion of disabled people. This article discusses disabled people are facing economic challenge and also challenges from the society.</td>
</tr>
<tr>
<td>(Clarke et al., 2009)</td>
<td>Journal article - International journal of special education</td>
<td>Interviews</td>
<td>There is a need to improve the disability policy in Britain in order to allow disabled workforce more involved to the labour market.</td>
</tr>
<tr>
<td>(Yazıcı et al., 2011)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Survey</td>
<td>The research results interpret the obstacles disabled employees have at work, it shows more experienced disabled worker have less problem and more satisfy about their job, and for those fewer experienced people they are facing many issues to get involved with their jobs and society.</td>
</tr>
<tr>
<td>(U.S. Census Bureau, 2010)</td>
<td>Website - U.S. Census Bureau</td>
<td>Statistical investigation</td>
<td>It shows the data about population of disabled people, different disabilities, employment, income and education about disabled people.</td>
</tr>
<tr>
<td>(Ormerod &amp; Newton, 2013)</td>
<td>Journal article - Construction Management and Economics</td>
<td>Interview</td>
<td>Most of the disabled young people feel themselves being rejected by the employment section due to the inequality and limitation from their disabilities.</td>
</tr>
<tr>
<td>(Frix &amp; Pal, 2010)</td>
<td>Conference - Conference on Information and Communication Technologies and Development</td>
<td>Qualitative interview</td>
<td>The lack of awareness of people with disabilities shows consequences of exclusion for them from employment issue, insufficient technology support and services issues.</td>
</tr>
</tbody>
</table>
As the articles listed in Table 4 discuss the employment situation to disabled people. The low incomes level of disabled people affects their usage of technologies (D’Aubin, 2007). It is important for everyone to have the financial source since the independent of economic can raise the level of living standard, and it improves people’s self-worth to the society from their contribution of socio-economic (Malakpa, 2007). Most of the disabled people are living in poor because their disabilities caused the limitation on workforce claimed by Clarke et al. (2009). Around 22% of disabled people claim they could not deal with their work easily due to their physical disadvantages. And 33.3% of disabled employees complains about their works because there are facing difficulties when they try to accomplish some tasks (Yazıcı et al., 2011).

The U.S Census Bureau (2010) statistics show that, nearly 13.3 million of people in the U.S. age from 16 to 64 cannot find jobs or keep being employed because of their health condition or physical defects. The total employment rate in the U.S. indicates only 46% of disabled people were employed and compare to 84% of employees without disability. And even beneath the low employment ratio among disabled people, they earn 42% less than non-disabled people (U.S. Census Bureau, 2010). The number explains that, there is numerous disabled people are under unemployed or with average low incomes, which make disabled people have no other choice but living in the low-quality life.

Back to thirty years ago, disabled people were strongly excluded from the labor market because of their physical problems. Most of the disabled people could not work independently and produce as much productivity as the people without disabilities (Clarke et al., 2009; Frix & Pal, 2010). Back to today’s market, the situation has not turned to any better. Most of the companies and firms require their employees can work alone or with long working hour, which are the challenges to people with disabilities. Additionally, as in construction sectors, the key factor prevents disabled people entry labor market is the recruitment. It requires work experience, proper training, professional skills and the ability to overcome the challenges such as deal with tasks in difficult work conditions (Clarke et al., 2009; Yazıcı et al., 2011). Ormerod and Newton (2013) also approved that the division of disabled workers is due to the reasons of lack of employment resource, lack of career choice and lack of training.

Someone argues that disabled people should not be constrained by their disabilities. They can be assigned to do other jobs such as part-time jobs, or some works that do not require walking or speaking (Malakpa, 2007). However, very few of the firms or companies can provide part-time jobs, especially in construction sectors. And the wage is normally evaluated based on the working hour and the working outcomes (Clarke et al., 2009). Based on the statistical data, some of the disabled people (75%) that have been employed due to the reason that they do not have severe disabilities (U.S. Census Bureau, 2010). Those, who have severe injuries or difficulties, can only stay at home with the help of their families or assistive technologies (Dobransky & Hargittai, 2006). Frix and Pal (2010) believe that the employability of disabled people is most important issue to improve the social image of disabled people for inclusion (see Table 5).

It is quite obvious that the degree of usage of ICT is lower among people with disabilities since they struggled by income and employment (Dobransky & Hargittai, 2006; Vicente & López, 2010). Based on the study from Macdonald and Clayton (2013) estimate 58% of disabled people admit that they have never used ICT because of their financial limitation. Wedasinghe and Wicramaarchchi (2014) assume that disabled digital divide can be reduced if disabled people are not facing the low incomes disadvantage (see Table 5).
<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Vicente &amp; López, 2010)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article finds out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation in using ICT.</td>
</tr>
<tr>
<td>(Dobransky &amp; Hargittai, 2006)</td>
<td>Journal article - Communication &amp; Society</td>
<td>Survey</td>
<td>The research found out that disabled people are not willing to pay ICT such as the computer and the Internet access, and they do not want to involve online activities. The reasons are because disabled people feel themselves lack of ICT knowledge, and they have physical limitations by their impairments, which let them feel not comfortable with technologies. Moreover, they consider the price of ICT is quite high.</td>
</tr>
<tr>
<td>(Macdonald &amp; Clayton, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The research found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
<tr>
<td>(Wedasinghe &amp; Wicramaarchchi, 2014)</td>
<td>Conference - Electrical Engineering and Information &amp; Communication Technology (ICEEICT) 2014</td>
<td>Literature study &amp; interview</td>
<td>The society has not aware the needs of people with different disabilities. This article discusses the barriers and difficulties of disabled people with the accessibility issue of ICT. They found out that ICT does not bring as many benefits as it brings to non-disabled people.</td>
</tr>
</tbody>
</table>

3.1.3 Additional costs for disabled people

There are 8 articles point out disabled people have to spend additional costs, which non-disabled people do not need to (see Table 6). Those articles mentioned that the assistive devices can be costly, but it is a necessity for some of the people with disabilities. Disabled people need to pay additional money for their lives, for example, assistive devices or equipment, and medical treatment fees. Before they can manage their lives by their own, it is difficult for them to spend some extra money on ICT.

Baker and Bellordre (2004) and D'Aubin (2007) mention that, assistive equipment such as wheelchair; hearing aid and visual aid are usually very expensive. Some of the disabled people, especially people with severe disabilities, are most likely depend on the support of assistive equipment to perform their daily routines (Dobransky & Hargittai, 2006). “For example, a person with a visual impairment who needs to make notes for him- or herself may need to purchase a product such as Braille ‘N Speak, which costs more than US$1,000. To use a personal computer, many visually impaired persons need to purchase a screen reading reading software” (D'Aubin, 2007, p. 194). Baker and Moon (2008) also indicate this issue in their research study that disabled consumers are more focus on the price of assistive technologies because no matter how important assistive technologies are for disabled people’s life, they still have to consider their financial condition. Those additional costs
are already high enough for disabled people, so they would not capable to spend more money on other mainstream technologies.

Table 6. List of articles discusses the additional costs for disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Baker &amp; Bellordre, 2004)</td>
<td>Conference - Proceedings of the 37th Hawaii International Conference on System Sciences - 2004</td>
<td>Literature study</td>
<td>The article indicates that the barriers of disabled people with technologies are due to the lack of professional knowledge, disabled people’s poor economic issue, and the incompatible design of the technology.</td>
</tr>
<tr>
<td>(Dobransky &amp; Hargittai, 2006)</td>
<td>Journal article - Communication &amp; Society</td>
<td>Survey</td>
<td>The research found out that disabled people are not willing to pay ICT such as the computer and the Internet access, and they do not want to involve online activities. The reasons are because disabled people feel themselves lack of ICT knowledge, and they have physical limitations by their impairments, which let them feel not comfortable with technologies. Moreover, they consider the price of ICT is quite high.</td>
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<tr>
<td>(D'Aubin, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>In Canada, there are barriers exist among people with disabilities when concerning the accessibility issue on ICT. The author believes it is important to enhance their policy and legislation in order to support the inclusion of disabled people. This article discusses disabled people are facing economic challenge and also challenges from the society.</td>
</tr>
<tr>
<td>(Baker &amp; Moon, 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey</td>
<td>The research illustrates the importance for manufacturers to pay more attention to the needs of disabled users, and make sure the technologies and products are accessible and usable by them.</td>
</tr>
<tr>
<td>(Kaye et al., 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey and questionnaire</td>
<td>The factors prevent disabled people from using assistive technologies are: their poor incomes, low education level, the lack of awareness of the importance of ICT and limitations from their impairments.</td>
</tr>
<tr>
<td>(Wong et al., 2009)</td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Survey</td>
<td>This article discusses disabled people in Hong Kong are excluded by the technologies. The problems prevent disabled people from using ICT are due to the reasons of the accessibility issue, the affordability issue and the issue of poor ICT knowledge.</td>
</tr>
<tr>
<td>(Vicente &amp; López, 2010)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article finds out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation in using ICT.</td>
</tr>
<tr>
<td>(Macdonald &amp; Clayton, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The research found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
</tbody>
</table>
Kaye, Yeager and Reed (2008) confirm that the usages of assistive technologies mostly covered by severe disabilities such as have difficulties in moving or climbing stairs. Moreover, the cost of the electric wheelchair is far beyond the cost of the computer. Those additional costs are already quite hard for them, which is also the reason they could not afford the usage of ICT anymore (Dobransky & Hargittai, 2006; Kaye et al., 2008). Wong et al. (2009) also agreed with their research paper that as long as disabled people want to take advantages from ICT, some of them have to buy expensive assistive devices to help them get access to the computer or other technologies. Therefore, disabled people have to bear some additional financial load than non-disabled people (Macdonald & Clayton, 2013).

Disabled people have to pay additional costs than non-disabled people because they have the needs of assistive devices or equipment. So, ICT seems to be the extra expense for disabled people, which they cannot afford it or they choose not to buy and use it.

3.2 Accessibility of ICT limited by disabled people

The lack of ICT accessibility available for people with disabilities caused the digital barriers between disabled people and non-disabled people. Technologies start to be the crucial obstacles that hold opportunities from people with disabilities (Wedasinghe & Wicramaarchchi, 2014).

3.2.1 ICT access limited by impairments

There are 8 papers show that there is a large proportion of people who are experiencing impairment disadvantages, are excluded from today’s e-Society (see Table 7). Impairments are the most obvious challenge for disabled people, despite they have money to afford various technologies, and there is assistive technology available to support their drawbacks, it is still a challenging task for them to have physical access to those technologies.

It is reasonable to see that disabled people choose not to buy ICT access because of their economic issue. However, it has been reported that disabled people still use ICT less than non-disabled people when compare their usages of ICT at the same income level (Vicente & López, 2010). Many studies indicate that the number of ICT usage can be affected not only by personal incomes, but also by other factors such as the impairments of disabled people (Doh & Stough, 2010; Cardona, 2013; Macdonald & Clayton, 2013; Tsali & Kontogianni, 2014).

For young people, it is very common and popular to share interesting websites or videos with their fellows, but for visually impaired or partially signed people, it shows challenges for them. Disabled people with visual impairment feel been isolated from their peer group because they cannot participant the discussion about information they see from the Internet (Söderström, 2009). Doh and Stough (2010) claim that the proportion of disabled people using ICT is much lower than those people without disabilities, because disabled people cannot get access to the Internet without the help of auxiliary facilities. Disabled people have to use assistive equipment to support their Internet surfing activities. But when without the help, the impairments of disabled people could not allow them to perform computer tasks freely. Kaye, Yeager and Reed (2008) found out disable people, especially those with more severe damages, have high demand for the usage of assistive device. Doh and Stough (2010) also assume that if the impairments do not prevent disabled people to use ICT, the number of ICT usage of people with disabilities cannot shows too much difference to people without disabilities.
Table 7. List of articles discusses the impairments of disabled people limited them to use ICT.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(Kaye et al., 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey and questionnaire</td>
<td>The factors prevent disabled people from using assistive technologies are: their poor incomes, low education level, the lack of awareness of the importance of ICT and limitations from their impairments.</td>
</tr>
<tr>
<td>(Söderström, 2009)</td>
<td>Journal article - Scandinavian Journal of Disability Research</td>
<td>Qualitative interview study</td>
<td>This study shows disabled young people are excluded by ICT since the ICT technologies are not usable and suitable for them.</td>
</tr>
<tr>
<td>(Vicente &amp; López, 2010)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article found out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation in using ICT.</td>
</tr>
<tr>
<td>(Doh &amp; Stough, 2010)</td>
<td>Journal article - International Review of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower amount of ICT usage than non-disabled people, and the number of ICT usage has no connection to the usefulness of technologies.</td>
</tr>
<tr>
<td>(Brandt, 2011)</td>
<td>Journal article - International Journal of Disability</td>
<td>Qualitative study - interview</td>
<td>This study found out that disabled people with higher education level have better knowledge of ICT, but they do not always receive the proper help for their needs. The society has not aware the issues of disabled people, which limited the path for them to have the equal access to the world.</td>
</tr>
<tr>
<td>(Cardona, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Qualitative interview study</td>
<td>Disabled people are limited by their impairments, which also limited their choice with technologies.</td>
</tr>
<tr>
<td>(Macdonald &amp; Clayton, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The research found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
<tr>
<td>(Tsaliki &amp; Kontogianni, 2014)</td>
<td>Journal article - Journal of Children and Media</td>
<td>Survey</td>
<td>The authors argue that the exclusion of disabled people from the digital society can be affected by their limitations from impairment and incomes disadvantage, but the most important factor is due to the lack of awareness by the society.</td>
</tr>
</tbody>
</table>
A qualitative study conducted by Brandt (2011) in the higher education practice in Norway demonstrates that, ICT has adopted as one of the teaching methods for their students with disabilities. However, for some of the students who have visual impairments appeared to have more difficulties when perform study tasks with ICT. ICT as the teaching platform causes challenges for disabled students, and it even shows the decreasing trend in the quality of education. “The disabled students who participated in this study did not have the same study opportunities as nondisabled students and barriers related to educational accessibility keep disabled students from acquiring expertise” (Brandt, 2011, p. 116).

The impairments from disabled people not only prevent the possibility to use ICT, but also shut the door from young people to socialize and communicate with their friends. Assistive technologies can be helpful, but as it mentioned before, not all the families could afford the price.

### 3.2.2 Lack of awareness about the importance of ICT

The following 6 articles indicate the issue that disabled people have less awareness about the importance of ICT, and they have no knowledge about using technologies to improve their lives (see Table 8). Since disabled people have so many constraints to get access to various technologies, they already get use to manage their daily lives without the help of technologies. They have been excluded from today’s society due to the lack of knowledge about how incredible improvement technologies can bring to them. The problem of exclusion has caused by disabled people themselves, as they are not aware and motivated to use ICT.

Some disabled people have not used ICT as much as the rest of the people in the world. A quantitative research study about disabled people in the U.K. demonstrates that 47% of people with disabilities have never associated with mobile phones and computers, and almost three-quarters of disabled people have never used laptops. Within those who have the access to ICT report that only half of the disabled users have their own mobile phones (Macdonald & Clayton, 2013).

Kaye, Yeager and Reed (2008) believe that education is one of the factors that affects disabled people whether to use ICT and assistive technologies. It is more important than the economic factor they have. Disabled people who have higher education are more willing to get to know ICT and see technologies as a helpful tool. They have been aware the usefulness of technologies that can bring a lot of benefits to their lives. Moreover, Doh and Stough (2010) also mentioned disabled people who are in low education level may have less access to ICT than others. Disabled people at different age ranges, however, also affect the acceptance of using ICT. Mid-aged and senior people use much fewer technologies than young people. Even though there is a high amount of usage in assistive equipment among elderly people, but those equipment are with very low technic features and only used for the purpose to help them move such as wheelchairs. As for young people, they mostly use ICT as the tool to be more socialized with the world (Kim & Doh, 2006; Vicente & López, 2010; Kaye et al., 2008). The problem of lack of awareness happened not only because of the society phenomenon that has ignored the needs of disabled people, but also because disabled people have not enough understanding of the importance of ICT and how technologies can benefit their lives.
Table 8. List of articles discusses disabled people are lack of awareness about the importance of ICT.

<table>
<thead>
<tr>
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<td>(Kaye et al., 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey and questionnaire</td>
<td>The factors prevent disabled people from using assistive technologies are: their poor incomes, low education level, the lack of awareness of the importance of ICT and limitations from their impairments.</td>
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<tr>
<td>(Vicente &amp; López, 2010)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article finds out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation in using ICT.</td>
</tr>
<tr>
<td>(Doh &amp; Stough, 2010)</td>
<td>Journal article - International Review of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower amount of ICT usage than non-disabled people, and the number of ICT usage has no connection to the usefulness of technologies.</td>
</tr>
<tr>
<td>(Kim &amp; Doh, 2006)</td>
<td>Journal article - Asia Pacific Journal of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower index data than non-disabled people, which are included access, number of usages, quality of usage and capacity. The crucial factor affects young people using ICT is due to their impairments. And for elder disabled people the problem shows from low technical education.</td>
</tr>
<tr>
<td>(Lidström et al., 2012)</td>
<td>Journal article - European Journal of Special Needs Education</td>
<td>Survey</td>
<td>Students with physical disabilities have less usage of ICT as their learning tools rather than students without disabilities.</td>
</tr>
<tr>
<td>(Macdonald &amp; Clayton, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The research found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
</tbody>
</table>

A survey study conducted by Lidström, Granlund and Hemmings (2012) indicate that the education system in the special school has ignored the importance of ICT for disabled students. The adoption of ICT as one of the teaching tools can be helpful for students since it allows students search information and perform learning activities online. However, the awareness of ICT in disabled students is depending on the teacher’s teaching style, but for teachers in the special school, they use less ICT as teaching facilities than the mainstream school.

So based on those authors’ opinions, the awareness level to technologies of disabled people depends on the factors of education background, age, gender, as well as the teacher’s teaching style.
3.2.3 Lack of ICT knowledge

In some of the developed countries such as the U.S. and Germany, it is quite common to separate disabled students from the regular classroom, and send them to the school, which is for “Special Education Needs”. Students with disabilities are isolated from the mainstream education system, which caused the gap in education. The unequal education system allocated disabled students to the bottom of the education hierarchy. Mostly, the special education communities have supported by its local government or communities, and the capital of funding is far not enough to afford the advanced teaching facilities (Powell, 2003). Ptushkin (2003) also point out that, disabled students need more help and attention than non-disabled students because of the limitations from their disability. Ignore the poor education system, there are more than 30 thousands of disabled students in the U.S. in the special school are lacking of professional training, and many of them need to be trained repeatedly.

There are 8 articles discuss that disabled people are less educated than non-disabled people, especially in the area of how to use ICT (see Table 9). There is a technical barrier for disabled people to get involved with technologies due to the reason of low level of knowledge about ICT (Dobransky & Hargittai, 2006). The study shows that disabled people, who obtained their disabilities from birth, are more comfortable to adopt assistive technologies as part of their lives, since they learned how to use those technologies from the special school. But, for those disabled people, who obtained their disabilities later, may show difficulties in using assistive technologies because they have not used those technologies before their damages (Kaye et al., 2008).

One of the reasons keeps disabled people away from technology is due to the fact of limited knowledge about how to use ICT. Many disabled people can afford computers at home, but they still do not use it as often as non-disabled people, because they have very less knowledge of how to use it. And for those parents, who have no idea about the benefits of ICT, have also limited their children to get access to the Internet. Because they think the content on websites or online games can bring negative influence to their children (Wong et al., 2009).

Vicente and López (2010) find out that, the amount of usage on ICT with disabled people can be affected by age, gender and education level. Senior and female users are feeling not confident enough than other users when using technologies, because they feel themselves are lacking of computer skills. 39% of disabled employees feel themselves have poor knowledge about assistive technology when using it at work (Jääskeläinen & Nevala, 2012; Watling & Crawford, 2010). Macdonald and Clayton (2013) mentioned the same reason in their research paper, the data shows 18% of their participants with disabilities have not used ICT because they feel they do not have any ICT knowledge. In Wedasinghe and Wicramaarchchi (2014)’s study, they point out that disabled people, especially those with visual disability are less motivated in using ICT because they have limited condition to pursue the higher level of education.

Most of the disabled people have to attend the special school for education, and those special schools may not capable of providing as good education as in mainstream schools. Therefore, the lack of ICT knowledge makes them feel less confident and less motivated to use them.
### Table 9. List of articles discusses disabled people are lack of ICT knowledge.

<table>
<thead>
<tr>
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<td><strong>(Dobransky &amp; Hargittai, 2006)</strong></td>
<td>Journal article - Communication &amp; Society</td>
<td>Survey</td>
<td>The research found out that disabled people are not willing to pay ICT such as the computer and the Internet access, and they do not want to involve online activities. The reasons are because disabled people feel themselves lack of ICT knowledge, and they have physical limitations by their impairments, which let them feel not comfortable with technologies. Moreover, they consider the price of ICT is quite high.</td>
</tr>
<tr>
<td><strong>(Kaye et al., 2008)</strong></td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey and questionnaire</td>
<td>The factors prevent disabled people from using assistive technologies are: their poor incomes, low education level, the lack of awareness about the importance of ICT and limitations from their impairments.</td>
</tr>
<tr>
<td><strong>(Wong et al., 2009)</strong></td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Survey</td>
<td>This article discusses disabled people in Hong Kong are excluded by the technologies. The problems prevent disabled people on using ICT are due to the reasons of the accessibility issue, the affordability issue and the issue of poor ICT knowledge.</td>
</tr>
<tr>
<td><strong>(Watling &amp; Crawford, 2010)</strong></td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Literature study</td>
<td>The society has failed to recognize the different needs of disabled people. This article advocates the solution for digital exclusion should emphasize to the improvement of digital policy and practice.</td>
</tr>
<tr>
<td><strong>(Vicente &amp; López, 2010)</strong></td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Survey</td>
<td>This article finds out disabled people have divided by the technology is caused by their affordability issue, the lack of technical knowledge, and lack of motivation on using ICT.</td>
</tr>
<tr>
<td><strong>(Jääskeläinen &amp; Nevala, 2012)</strong></td>
<td>Conference - ICCHP’12 Proceedings of the 13th international conference on Computers Helping People with Special Needs</td>
<td>Survey</td>
<td>The study found out most of the disabled people are not familiar with assistive technologies when at workplace, they feel computer devices are incompatible and not enough options available for them.</td>
</tr>
<tr>
<td><strong>(Macdonald &amp; Clayton, 2013)</strong></td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The research found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
<tr>
<td><strong>(Wedasinghe &amp; Wirramaarchchi, 2014)</strong></td>
<td>Conference - Electrical Engineering and Information &amp; Communication Technology (ICEEICT) 2014</td>
<td>Literature study &amp; interview</td>
<td>The society has not aware the needs of people with different disabilities. This article discusses the barriers and difficulties of disabled people with the accessibility issue of ICT, they found out that ICT does not bring as much benefits as it brings to non-disabled people.</td>
</tr>
</tbody>
</table>
3.3 Social phenomenon about disabled people

Oliver and Barnes (2010) notice that, “…people were not disabled by the functional limitations of their impairments but by the external barriers that prevented their full participation in the societies in which they lived” (pp. 549-550). The social phenomenon is one of the key factors effects disabled people to have the equal access to technologies.

3.3.1 ICT design for disabled people

There are many assistive technologies available in the market, which have developed to support the life of disabled people. For example, with the help of audio feature and sign language available on mobile devices to assist blind and visually impaired people to have the access on using those technologies (El-Gayyar et al., 2013). Physically disabled people can manage their daily life via the Internet such as pay bills with net bank service, shopping online, communicate with friends through social network or even enjoy their free time with computer games. They can find information and knowledge that fulfill their needs and ease the difficulties from their disabilities (Garbutt & Kyobe, 2013). However, there are 17 articles state the issue that the design of ICT is not compatible enough for people with disabilities.

Kim and Doh (2006) advocate that the policy for saving digital divide with disabled people should more focus on “qualitative usage index” rather than “quantitative usage index” (p. 249), since the number of usage of ICT is not much relevant to the level of usefulness to disabled people. The more important task is to eliminate the challenges that prevent disabled people from sending, receiving and processing information with all the resource, so the portals should available to people with disabilities. There are 70% of disabled users vote for compatibility of digital technology as the most important factor for them to have the equal access to technologies. And as it emphasizes that the design of digital products is extremely matter to people with disabilities (Baker & Moon, 2008).

Söderström (2009) claims that ICT can help to improve disabled people from their personal and social lives, but there are still some technical problems prevent them enjoy the benefit from technologies freely. For people with visual disability, it is difficult to provide corresponding technologies to help them access to the Internet, since the majority websites contain graphical content, which is unreadable for visually impaired people. And, most of the websites are not designed with Braille display or in the audio form (Söderström, 2009; Mokiwa & Phasha, 2012; Shahkooh & KhodaBande, 2006; Glinert & York, 2008). The research shows that for handicapped people, they stopped chatting with their friends online because they are not able to type texts fast enough. A lot of case studies show the explanation of this technical issue, the design of assistive technologies cannot fulfill the actual needs of disabled users. “Their challenges are, however, connected to digital access, and ICT assistive devices’ usability or suitability” (Söderström, 2009, p. 142; D'Aubin, 2007; Harris, 2010) (see Table 10).
Table 10. List of articles discusses the design of assistive technologies is not useful enough.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Kim &amp; Doh, 2006)</td>
<td>Journal article - Asia Pacific Journal of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower index data than non-disabled people, which are included access, number of usages, quality of usages and capacity. The crucial factor affects young people using ICT is due to their impairments, and for elder disabled people the problem shows from low technical education.</td>
</tr>
<tr>
<td>(Shahkooh &amp; KhodaBandeh, 2006)</td>
<td>Conference - Information and Communication Technologies, 2006. ICTTA ’06. 2nd</td>
<td>Design science research</td>
<td>This study investigates the issue in the design of e-Government service websites, which should be improved in order to allow accessibility to disabled people.</td>
</tr>
<tr>
<td>(D’Aubin, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>In Canada, there are barriers exist among people with disabilities when concerning the accessibility issue on ICT. The author believes it is important to enhance their policy and legislation in order to support the inclusion of disabled people. This article discusses disabled people are facing economic challenge and also challenges from the society.</td>
</tr>
<tr>
<td>(Baker &amp; Moon, 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey</td>
<td>The study illustrates the importance for manufacturers to pay more attention to the needs of disabled users, and make sure the technologies and products are accessible and usable by them.</td>
</tr>
<tr>
<td>(Glinert &amp; York, 2008)</td>
<td>Journal article - ACM Transactions on Accessible Computing (TACCESS)</td>
<td>Literature study</td>
<td>The authors conducted five articles review about the needs and solutions for digital design.</td>
</tr>
<tr>
<td>(Harris, 2010)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Literature study</td>
<td>Disabled people are willing to use high-technical devices, however, nowadays they stopped purchasing technical products because of the expensive cost and complex to use. The article advocates technical products for disabled people should accessible for them.</td>
</tr>
<tr>
<td>(Söderström, 2009)</td>
<td>Journal article - Scandinavian Journal of Disability Research</td>
<td>Qualitative interview study</td>
<td>This study shows disabled young people are excluded by ICT since the ICT technologies are not usable and suitable for them.</td>
</tr>
</tbody>
</table>

The articles in Table 11 show that, it is very important in designing assistive technology. For disabled users with visual disabilities, the help from assistive technologies is the only possibility for them to be able to socialize with different societies. Their lives are strongly depending on the assistances from various technologies (Söderström & Ytterhus, 2010; D’Aubin, 2007; Watling & Crawford, 2010). The survey participants in Hong Kong complain that the computer is very difficult to use, and “even if they know how to use ICT they are unable to take full advantage of it” (Wong et al., 2009, p. 75). Tandy and Meacham (2009) declare that
applications and documents are mostly incompatible with the assistive devices. Although disabled users have both computers and assistant technologies, they are still facing the problem of inaccessibility.

**Table 11.** List of articles discusses the importance of design in technologies for disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Söderström &amp; Ytterhus, 2010)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Qualitative interview study</td>
<td>This study found out visual impaired young people refuse to use assistive technologies since they prefer to look the same as others, and for complete blind people, they have no choice but use assistive technologies in order to get access to the Internet.</td>
</tr>
<tr>
<td>(Wong et al., 2009)</td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Survey</td>
<td>This article discusses disabled people in Hong Kong are excluded by the technologies. The problems prevent disabled people from using ICT are due to the reasons of the accessibility issue, the affordability issue and the issue of poor ICT knowledge.</td>
</tr>
<tr>
<td>(Watling &amp; Crawford, 2010)</td>
<td>Journal article - Journal of Technology in Human Services</td>
<td>Literature study</td>
<td>The society has failed to recognize the different needs of disabled people. This article advocates the solution for digital exclusion should emphasize to the improvement of digital policy and practice.</td>
</tr>
<tr>
<td>(Tandy &amp; Meacham, 2009)</td>
<td>Journal article - Journal of Teaching in Social Work</td>
<td>Literature study</td>
<td>This article discusses the challenges that disabled students are having in the academic area. Web-based or e-learning courses can be helpful for disabled students but meanwhile also caused barriers and difficulties for them.</td>
</tr>
</tbody>
</table>

A research concerning the ICT user experience in young people illustrates that some young people reject to use assistive technology to compensate their life or study because assistive devices slow down their movements. They feel technologies are inconvenient and frustrate to use, their performance has been restricted by the device function. And moreover, they prefer to finish tasks independently rather than depending on assistive devices. More importantly, assistive technologies make them feel unordinary from other people. So, they would rather to hanging out with “poor game players” without the help of assistive devices instead of trying to keep up the steps of those friends who are good at accomplishing games (Söderström & Ytterhus, 2010, p. 307). Harris (2010) reports that disabled people sometimes choose not to use technologies because they think “time consuming and exhausting to use” (p. 436). Some of the software is difficult for them to use and understand. “When a person trying to use some software or hardware finds himself or herself confronted by a range of technical problems, he or she is likely not only to stop trying but also to develop a fear of technology (p. 59)” claimed also by Vicente and López (2010). Same issue was retrieved by Mokiwa and Phasha (2012) they state that students with visual impairments perform poor study results. Some of them even drop out the subjects, because they had bad ICT use experience when they were trying to use it in their studies.
Table 12. List of articles discusses the failure design of technologies for disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Oliver &amp; Barnes, 2010)</td>
<td>Journal article - British Journal of Sociology of Education</td>
<td>Literature study</td>
<td>It is important to let the society understand the challenge of disabled people, and to make movement reach inclusion.</td>
</tr>
<tr>
<td>(Elleessor, 2010)</td>
<td>Journal article - Information, Communication &amp; Society</td>
<td>Literature study</td>
<td>This article conducted a literature study from the historical point of view to see the development of policy and accessibility on web content for disabled users.</td>
</tr>
<tr>
<td>(Soares, 2012)</td>
<td>Journal article - Theoretical Issues in Ergonomics Science</td>
<td>Survey and design</td>
<td>This study advocates a user-centred design method to collect disabled people’s needs and put them into product design.</td>
</tr>
<tr>
<td>(Mokiwa &amp; Phasha, 2012)</td>
<td>Journal article - Africa Education Review</td>
<td>Interview</td>
<td>This study shows the usage of ICT in disabled people does not always show positive outcomes, especially for users with visual disability. The author found out the reasons, which are because of unsuitable design, the limitation of visual disability, lack of communication and the unaffordable price of ICT.</td>
</tr>
<tr>
<td>(Cardona, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Qualitative interview study</td>
<td>Disabled people are limited by their impairments, which also limited their choice with technologies.</td>
</tr>
<tr>
<td>(Macdonald &amp; Clayton, 2013)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Quantitative research</td>
<td>The study found out ICT or assistive technologies have not played the role to enhance disabled people’s life from social exclusion. Instead, the digital technologies become the new challenges and form digital divide in people with disabilities.</td>
</tr>
</tbody>
</table>

The usage of ICT is lower for people with disabilities also because the bad technology use experience that disabled people had. The complication of technologies in use reduced users interests (Vicente & López, 2010). Cardona (2013) agrees that, the lack of common awareness in technology development and design for disabled people can lead the results of limitation of assistance choice and misunderstand disabled users’ needs. For example, the design of public services has not taken a good care of the needs of people with disabilities especially for visually impaired people, as they need specialized rehabilitation services to support their mobility and performance. For example, read the bus timetable in public transportation. Those facilities and technologies are designed for people without disabilities, and only very few amounts of disabled people can benefit from ICT. The accessibility of ICT for disabled people also depends on the availability of assistive technologies available in the market since the technologies cannot cover the needs for all kinds of disabilities. Many types of disabilities are difficult to take into account in product design, and most of manufacturers are not willing to take disabling design into their products (Macdonald & Clayton, 2013; Watling & Crawford, 2010).

Moreover, The design of assistive technologies is not as good as what people expected when considered the actual usefulness of the product for disabled people. Assistive
product producers and designers feel that it is quite difficult to understand the real needs of people with different kinds of disabilities. The design of assistive products is not like the regular products designed for non-disabled people. The design of assistive products requires so many different design assumptions considering different needs of their disabled customers. It is impossible to design a universal product, which can suitable for all (Soares, 2012; Macdonald & Clayton, 2013; Ellcessor, 2010). What is more, it is also a challenge for disabled people to tell their needs by themselves for assistive products. It is a difficult work for designers to design the products, which are visually pleased and easy to use for disabled users. The user interface design needs to take extra attention, so that it can be convenient and suitable for their users (Soares, 2012; D'Aubin, 2007) (see Table 12).

Assistive technologies can help disabled people access to the computer and the Internet. However, even though there are a huge number of assistive technologies available in the market, some of the failure design of the technology shows opposite outcomes for disabled users. A fully functional device does not mean it is useful and can fulfill disabled users' needs because the incompatible design could not bring benefits but only troubles for disabled users. Moreover, the design of the public services, online software and application have not taken disable friendly into account, which also lead disabled people could not fully take the advantage of ICT.

### 3.3.2 Lack of research/awareness on disabled people

There are 28 articles point out that disabled people have been isolated from the society and it was caused by the lack of awareness and research on the issues of disabled people. In another word, the society has not paid enough attention to the disabled group. Social awareness about disabled people is one of the reasons caused the issue of disabled divide from using technologies in today’s society.

The research about telecommunication services in Australia demonstrates the fact that the service and content providers have not aware the issue of people with disabilities. Therefore, disabled people are not able to access corresponding services due to the design of the technologies are not disabled friendly (Goggin & Newell, 2004; Ellcessor, 2010). “Not only is adaptive technology difficult to learn and expensive, but it lags in development behind the technology to which it is supposed to enable access” (p. 329) agreed by Dobransky and Hargittai (2006). D'Aubin (2007) also claims that when the latest technology went to the market, disabled people always have to wait until the compatible version is available for them, so they feel always left behind. What is more, manufacturers are less aware of providing enough product information for their potential users in order to help them to select the product, which is suitable for their needs. However, as in Goggin and Newell’s (2007) research, they state that companies and manufacturers choose not to have universal design since the process can be complex and expensive. Some of the products or technologies are impossible to have design solutions for disabled users such as users with mental disabilities. The authors believe that the factors of social and culture phenomenon are the key factors influence the tendency of today’s market. The lack of accessibility for disabled people is due to lack of understanding about the importance of disabling inclusion. Stienstra et al. (2007) agree and proved the same research results in their study. Governments, however, play the essential role in this society, have not putted this issue into their agenda yet. Regulations, laws, and policies are not well enough to affect universal access available for disabled people. They seem to care more about the majority needs in the market and ignored the fact that disabled people should be included as part of the supply chain as well (see Table 13).
Table 13. List of articles discusses the lack of awareness in universal design.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Goggin &amp; Newell, 2004)</td>
<td>Journal article - Prometheus: Critical Studies in Innovation</td>
<td>Literature study</td>
<td>This research paper argues the policy and services in Australia have not concerned the issue of disabled people, which limited the accessibility of them from telecommunication technologies.</td>
</tr>
<tr>
<td>(Ellcessor, 2010)</td>
<td>Journal article - Information, Communication &amp; Society</td>
<td>Literature study</td>
<td>This article conducted a literature study from the historical point of view to see the development of policy and accessibility on web content for disabled users.</td>
</tr>
<tr>
<td>(Dobransky &amp; Hargittai, 2006)</td>
<td>Journal article - Communication &amp; Society</td>
<td>Survey</td>
<td>The research found out that disabled people are not willing to pay ICT such as the computer and the Internet access, and they do not want to involve online activities. The reasons are because disabled people feel themselves lack of ICT knowledge, and they have physical limitations by their impairments, which let them feel not comfortable with technologies. Moreover, they consider the price of ICT is quite high.</td>
</tr>
<tr>
<td>(D'Aubin, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>In Canada, there are barriers exist among people with disabilities when concerning the accessibility issue on ICT. The author believes it is important to enhance their policy and legislation in order to support the inclusion of disabled people. This article discusses disabled people are facing economic challenge and also challenges from the society.</td>
</tr>
<tr>
<td>(Goggin &amp; Newell, 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>The inclusion of disabled people in business area is difficult to manage since companies and manufacturers think universal design is costly and complex.</td>
</tr>
<tr>
<td>(Stienstra et al., 2007)</td>
<td>Journal article - The Information Society: An International Journal</td>
<td>Literature study</td>
<td>This study investigates how government, industries, and organizations develop the issue of accessibility for people with disabilities in the society, it shows the facts that in order to build disability accessibility, factors such as price, design, policy, regulation have to take into account.</td>
</tr>
</tbody>
</table>

Technology such as wireless devices are even less adopted by disabled consumers since the product is normally complex to use. Meanwhile, industries and manufacturers have not demonstrated or highlighted the guidance information to their customers. For example, by posting the usefulness and importance of assistive technology information via advertisement or by other means, in order to let disabled users understand the current released technologies and helps them to choose and use those technologies (Baker & Moon, 2008; Yazıcı et al., 2011). Baker, Hanson and Bell (2008) had their study with couple of municipal projects demonstrate that there are around 70% projects try to put effort to e-inclusion on the design of wireless project. But, they found out the
design of the project still has not considered too much about the users with disabilities. The reason is because the government and project designer have less knowledge about the concept of disabilities. Even though e-Government provides assistances and services for various vulnerable groups, it still has not covered completely such as mentally disabled people (Każemikaitiene & Bilevičiene, 2008). Kaye, Yeager and Reed (2008) point out that there is nearly no usage of technologies among people with mental disabilities because there is so few of technologies available for them. Frix & Pal (2010) advocate that if public services and education centers can provide accessible means to people with different disabilities, it would show great improvement to this vulnerable group from not only socially but also financially. The visibility of disabled people in the society is the crucial way to enhance their images in the public and in a way to reach the inclusion of digital gaps (see Table 14).

**Table 14.** List of articles discusses there are limited products available for disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Każemikaitiene &amp; Bilevičiene, 2008)</td>
<td>Journal article - Ukio Technologinis ir Ekonominis Vystymas</td>
<td>Case study</td>
<td>This study found out that the design of ministry websites is not disability friendly, which caused the problem of difficult to access by disabled people.</td>
</tr>
<tr>
<td>(Baker &amp; Moon, 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey</td>
<td>The research illustrates the importance for manufacturers to pay more attention to the needs of disabled users, and make sure the technologies and products are accessible and usable by them.</td>
</tr>
<tr>
<td>(Kaye et al., 2008)</td>
<td>Journal article - Assistive Technology: The Official Journal of RESNA</td>
<td>Survey and questionnaire</td>
<td>The factors prevent disabled people from using assistive technologies are: their poor incomes, low education level, the lack of awareness of the importance of ICT and limitations from their impairments.</td>
</tr>
<tr>
<td>(Frix &amp; Pal, 2010)</td>
<td>Conference - Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development</td>
<td>Qualitative interview</td>
<td>The lack of awareness of people with disabilities shows consequences of exclusion for them from employment issue, insufficient technology support and services issues.</td>
</tr>
</tbody>
</table>

Rothman (2010) claims that the barriers from social and environmental aspects have influenced the life of people with disabilities. And so far, there are very few amount of study concerning the issues and problems of people with disabilities. Although, governments advocate people should pay more attention to those vulnerable groups, most of the actions have only focused on the innovation of new assistive devices and the number of usages. They have ignored the usefulness of those technologies for disabled users (Doh & Stough, 2010). The lack of disabled design and vocational training for disabled people caused employment challenges, which shows the fact that the society should put more effort to the development of disabled employees (Yazıcı et al., 2011). Jääskeläinen and Nevala (2012) indicate that disabled users wish to have more choices in assistive technologies, as well as flexible online program on the computer (see Table 15).
Table 15. List of articles discusses the lack of awareness in the usefulness of products for disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Yazıcı et al., 2011)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Survey</td>
<td>The research results interpret the obstacles disabled employees have at work, it shows more experienced disabled worker have less problem and more satisfy about their job, and for those fewer experienced people they are facing many issues to get involved with their jobs and society.</td>
</tr>
<tr>
<td>(Rothman, 2010)</td>
<td>Journal article - Journal of Social Work in Disability &amp; Rehabilitation</td>
<td>Literature study</td>
<td>The study illustrates that disabled people can be affected by biological, psychological, social, culture and spiritual aspects.</td>
</tr>
<tr>
<td>(Doh &amp; Stough, 2010)</td>
<td>Journal article - International Review of Public Administration</td>
<td>Survey</td>
<td>Disabled people have lower amount of ICT usage than non-disabled people, and the number of ICT usage has no connection to the usefulness of technologies.</td>
</tr>
<tr>
<td>(Jääskeläinen &amp; Nevala, 2012)</td>
<td>Conference - ICCHP'12 Proceedings of the 13th international conference on Computers Helping People with Special Needs</td>
<td>Survey</td>
<td>The study found out most of the disabled people are not familiar with assistive technologies, especially use them at the workplace. And they feel difficult to use the computer because the design of assistive technologies is incompatible.</td>
</tr>
</tbody>
</table>

Moreover, some education facilities have not noticed the importance of ICT usage for disabled students to enhance their education needs (Seale, 2013; Green & Huprich, 2009). Some disabled people refuse to use assistive technologies because they would receive some extra attentions from others, which have virtually enlarged the pain and inferiority from their impairments (Öderström & Ytterhus, 2010, p. 307; Seale, 2013). Wei (2012) indicates that policies should play a more supportive role in disabling education system. For example, to motivate schools or teachers to be more patient and creative with disabled students by providing teaching rewards or other encouragements (see Table 16).

Very few research data has documented so far about the user experience from disabled people by using technologies. The society is not familiar with disabled people’s behavior and way of feelings when they use assistive technologies or ICT products, which show difficulties in the design of products for disabled people (Mokiwa & Phasha, 2012; Banda-Chalwe et al. 2012). People with disabilities are experiencing challenges when traveling or being in public. The design of public infrastructure, facilities and technologies are mostly not disabled friendly (Wedasinghe & Wicramaarchchi, 2014; Sackey, 2014).

Enterprises, who should also takes the responsibility of the inclusion of disabled people in the digital world. However, the goal for most of the enterprises and firms is to make money. The investments in disabled customers are not as much profitable as in mainstream customers, and the costs for covering disabled friendly development are quite high. So, it explains why there is limited number of technical products for disabled people in the market (Mandal & Ose, 2013). The research in the EU countries about the accessibility of e-government services shows that only 12.5% of the websites has
considered disabled friendly design and the policy and legislation for disabled people are still incomplete and not sufficient enough (Easton, 2013) (see Table 17).

Table 16. List of articles discusses disabled people have effected by the society.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Green &amp; Huprich, 2009)</td>
<td>Journal article - Journal of Access Services</td>
<td>Survey</td>
<td>The survey shows schools of library and information science, and universities have the instruction of Americans with Disabilities Act (ADA) available for their students, however, it is not a mandatory course for most of the education institutions. The author explains the reasons are because of the social phenomenon and less legal support on this issue.</td>
</tr>
<tr>
<td>(Seale, 2013)</td>
<td>Journal article - Media and Technology</td>
<td>Literature study</td>
<td>The study found disabled people are excluded due to the reason of social phenomenon, which refers to the society has not paid enough supportive network for disabled students and it shows lack of understanding about the value of ICT technology means to academic performance for disabled students.</td>
</tr>
<tr>
<td>(Söderström &amp; Ytterhus, 2010)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Qualitative interview study</td>
<td>The study found visual impaired young people refuse to use assistive technologies since they prefer to look the same as others, and for complete blind people, they have no choice but use assistive technologies in order to get access to the Internet.</td>
</tr>
<tr>
<td>(Mokiwa &amp; Phasha, 2012)</td>
<td>Journal article - Africa Education Review</td>
<td>Interview</td>
<td>This study shows the usage of ICT in disabled people does not always show positive outcomes, especially for users with visual disability. The author found out the reasons, which are because of unsuitable design, the limitation of visual disability, lack of communication and the unaffordable price of ICT.</td>
</tr>
<tr>
<td>(Banda-Chalwe et al., 2012)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Literature study</td>
<td>The study illustrates the lack of policy and system for disabled people in Africa. Disabled people in developing countries have not attracted much attention from the world with the factors of equal rights and involvement.</td>
</tr>
<tr>
<td>(Wei, 2012)</td>
<td>Journal article - Journal of Research on Educational Effectiveness</td>
<td>Survey</td>
<td>The study shows there is no difference for schools and teachers to put effort on developing the performance of disabled students.</td>
</tr>
</tbody>
</table>

In Portugal, the movement for the inclusion of disabled people was left behind since the insufficient policy and lack of social awareness about disabled people (Fontes, 2014; Banda-Chalwe et al., 2012). Kulkarni and Rodrigues (2014) report that, in some countries, industries and manufacturers have no related cooperation with disabled communities and only half of the organizations are willing to take the disability issue into their annual plans in the future. For some private sector organizations, they provide financial support to disabled people but have not taken recruitment issue into account. In another report shows that many disabled people in developing countries, have neither financial support nor employment support (Sackey, 2014). Tsaliki and Kontogianni
(2014) believe that the exclusion of disabled people caused by the society is more crucial than the limitation from their disabilities.

Table 17. List of articles discusses organizations and governments deal the problems of disabled people.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Baker et al., 2008)</td>
<td>Conference - The Proceedings of the 9th Annual International Digital Government Research Conference</td>
<td>Survey</td>
<td>The research found out that more than half (61.29%) of the organizations have no consideration for disabled people when design and develop wireless projects.</td>
</tr>
<tr>
<td>(Easton, 2013)</td>
<td>Journal article - International Review of Law, Computers &amp; Technology</td>
<td>Qualitative research</td>
<td>The research investigates the accessibility of e-government services in European countries, and it illustrates only around 12% of governmental websites passed the test of accessibility for disabled people. The universal design of governmental services in the EU are failed to achieve access for all.</td>
</tr>
<tr>
<td>(Mandal &amp; Ose, 2013)</td>
<td>Journal article - Scandinavian Journal of Disability</td>
<td>Qualitative research/ Interview and survey</td>
<td>The study illustrates Work Life Centres are the crucial organizational resources that can affect enterprises’ attention to disabled group by accepting the agreement on a more inclusive work life (IA agreement).</td>
</tr>
<tr>
<td>(Fontes, 2014)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Survey</td>
<td>The article investigate the social movement of disabled people in Portugal, and it shows that the Portuguese have not cooperated with any organization to activate disability movement, and the policy and strategy for disabled people in Portugal are still not comprehensive.</td>
</tr>
<tr>
<td>(Kulkarni &amp; Rodrigues, 2014)</td>
<td>Journal article - The International Journal of Human Resource Management</td>
<td>Survey</td>
<td>This research examines annual report about the level of organization engagement in people with disabilities in India, it shows that although organizations have some supportive activities to disabled people, it still not good enough.</td>
</tr>
<tr>
<td>(Wedasinghe &amp; Wiramaarchchi, 2014)</td>
<td>Conference - Electrical Engineering and Information &amp; Communication Technology (ICEEICT) 2014</td>
<td>Literature study &amp; interview &amp; interview</td>
<td>The society has not aware the needs of people with different disabilities. This article discusses the barriers and difficulties of disabled people with the accessibility issue of ICT. They found out that ICT does not bring as many benefits as it brings to non-disabled people.</td>
</tr>
<tr>
<td>(Tsaliki &amp; Kontogianni, 2014)</td>
<td>Journal article - Journal of Children and Media</td>
<td>Survey</td>
<td>The authors argue that the exclusion of disabled people from the digital society can be affected by their limitations from impairment and incomes disadvantage, but the most important factor is due to the lack of awareness by the society.</td>
</tr>
<tr>
<td>(Sackey, 2014)</td>
<td>Journal article - Scandinavian Journal of Disability Research</td>
<td>Survey</td>
<td>The study investigates social and political concerns about people with disabilities in Ghana. The results found out disabled people are lack of support, communication, and accessible availability.</td>
</tr>
</tbody>
</table>
Manufacturers and industries need to take more attention to the needs of disabled customers. The design of the technologies is important and let disabled people have the equal access to the digital world is more crucial in today’s society. The service and product providers should consider more about the usefulness of the technologies for disabled people than the amount of usage. Governments, communities and organizations need to advocate more sufficient policies, legislations and regulation to disabled people, especially in developing countries.

3.3.3 Lack of communication

Listening the voice of disabled people is the essential way to understand their problems and needs. Many researchers point out that there is a lacking of communication to disabled people when they are trying to use ICT. There are 5 articles state this issue (see Table 18).

Table 18. List of articles discusses the issue of lacking of communication.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Publication</th>
<th>Research Method</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Priestley et al., 2010)</td>
<td>Journal article - Disability &amp; Society</td>
<td>Survey</td>
<td>The survey shows the society and organizations of disabled people are willing to put afford to develop an equal disabling society, however, it is limited by the source of funding and knowledge about disabled people.</td>
</tr>
<tr>
<td>(Mokiwa &amp; Phasha, 2012)</td>
<td>Journal article - Africa Education Review</td>
<td>Interview</td>
<td>This study shows the usage of ICT in disabled people does not always show positive outcomes, especially for users with visual disability. The author found out the reasons, which are because of unsuitable design, the limitation of visual disability, lack of communication and the unaffordable price of ICT.</td>
</tr>
<tr>
<td>(Seale, 2013)</td>
<td>Journal article - Media and Technology</td>
<td>Literature study</td>
<td>The study found out disabled people are excluded due to the reason of social phenomenon, which refers to the society has not paid enough supportive network for disabled students and it shows lack of understanding about the value of ICT technology means to academic performance for disabled students.</td>
</tr>
<tr>
<td>(Cumming &amp; Dickson, 2013)</td>
<td>Journal article - Assessment in Education: Principles, Policy &amp; Practice</td>
<td>Literature study</td>
<td>This article shows the literature study of educational accountability test in Australia about disabled students, the results found out Australian government is lack of practice for disabled students for inclusion.</td>
</tr>
<tr>
<td>(Sackey, 2014)</td>
<td>Journal article - Scandinavian Journal of Disability Research</td>
<td>Survey</td>
<td>The study investigates social and political concerns about people with disabilities in Ghana, the results found out disabled people are lack of support, communication, and accessible availability.</td>
</tr>
</tbody>
</table>
Some organizations believe that in order to provide proper solutions for disabled people’s problems, the best way is to keep good communication with them. By understanding disabled people’s behavior and needs are the key to improve their lives in the e-Society (Priestley et al., 2010). From Mokiwa and Phasha (2012)’s case study about adopting ICT as the learning platform for students with visual disability shows that there is a problem of lacking communication between blind students and ICT administrators in schools. Students have not informed to their supervisor that the learning software they are using is always outdated. From the other aspect, the ICT administrators have not noticed this problem at all since they never asked this situation to their students. Seale (2013) point out that the lack of communication between school departments and disabled students show problems and difficulties in adopting ICT in education. It seems that school departments have not taken a good care with their students when providing ICT as the leaning platform. Even though some schools are trying to provide a better education system with the help of technologies, the less attention and communication still can cause challenges to disabled students (Cumming & Dickson, 2013). One survey study in Ghana also tells about the lack of communication to people with disabilities causes challenges to them in the public. Visually and hearing disabled people need to let public organizers understand the availability of public service information is important for them (Sackey, 2014).

The lack of communication to disabled people causes challenges when they try to adopt ICT to catch the step of the digital world. Using ICT as one of the teaching platforms can provide more learning opportunities for disabled students. However, the lacking communication may leads opposite teaching outcomes. So, by understanding the needs of disabled people by good communication would help them get out from technologies problems.
4. Findings

This research was conducted by following the principles of systematic literature review method, and the purpose was to find out the issues and problems disabled people meet in the e-Society. There are 51 articles selected to support this study, and based on the content and findings indicated in those articles, three themes are formalized to organize different problems and challenges disabled people have.

The study found out the reason cause disabled digital exclusion is due to the accessibility issue from both disabled people themselves and the outsiders. The use of technologies by disabled people can be limited by their impairments if there is no corresponding assistive technology available for them such as for people with visual, hearing or mental disabilities. The low levels of income and education can affect the usage of technology by disabled people as well since the poor living condition is one of the elements marginalized them from the society. Nevertheless, the most important factor is from the social phenomenon, which means the whole society has not paid enough attention to the disabled group.

Firstly, in today’s market, digital devices and high-tech products are marked as expensive items. No matter for disabled or non-disabled people, it is an economical obstacle prevents them from using or buying those technologies. And it seems even more challenging for people with disabilities since most of them cannot acquire jobs to keep stable incomes. Although there is a small amount of disabled people able to work for some firms or companies, their income level is still not high enough compare to the average income level of non-disabled workers. Disabled people’s living condition is mostly depending on their different level and kind of disabilities. For those people with severe disabilities such as visual impairment, mental disability or disabled in mobility are facing more challenges in acquiring jobs. The lost of functions from various disabilities may cause lower working outcomes compare to non-disabled workers, and that lead disabled people earn less money than the average income rate. Moreover, disabled people have to spend additional costs for their medical treatment, assistive equipment, and other medical devices. Those costs are normally quite expensive, which bring more challenges to their lives. Therefore, before disabled people can manage their lives properly, they would not consider buying computers or other technologies.

Secondly, as the impairments of people with disabilities are not only affect their income level and employment rate, but also limited their physical access to technologies. For people with mental and visual disabilities, it is more difficult for them to type by a computer, to read information online, or to entertain themselves with online videos and games. Nevertheless, not all the disabled people have the knowledge about how to use computers or other technical devices. Some of them even have no understanding about the remarkable changes that technologies can make to their lives. The awareness of the importance of ICT by disabled people influences their ICT usage number. Disabled people with younger age, or with higher education level are more willing to accept technologies, and they believe that technologies can improve their lives. But for disabled people with less ICT knowledge, they are quite optimistic in using ICT because they are afraid of making mistakes. When technical problems happened, they do not know how to deal with them. So, in this situation, the bad use experience may causes the result of stop using ICT.
Lastly, disabled people have less access to technologies can also caused by the failure design of technical products. Assistive technologies are the important medium that allows disabled people to have the access with the digital world. However, some insufficient design of the products brings frustrating use experience to disabled users. For young disabled users, assistive technologies seem to be the troubles that attract extra attention from others, and let them feel different. So, they would refuse to keep using those technologies. As the design of most online application, software and websites is not disabled friendly, disabled people are facing the problem of limited accessibility. For example, blind or visual impaired people cannot read text from webpages if the design of the webpages have not used Braille display or available in audio form. Assistive technologies, however, can support disabled people with online activities in many ways, but sometimes the design of the assistive product is not compatible with other technologies such as computers, software or online applications. Disabled people feel left behind by the digital society since the design of those technologies is not always accessible. Even for some e-government services, their webpages have not fully covered the idea of universal design. Web content providers, service providers and designers need to understand the different needs of their users, which include users with disabilities. The promotion of assistive technologies is important as well. Because disabled people may have willingness to buy technologies but it can be limited by lacking information. In addition, the communication issue is mentioned also since by understanding disabled people’s problems and needs can essentially improve the social awareness, which in a way to motivate the whole society to reach the goal of e-inclusion.

![Graph showing number of articles in different theme discussion](image)

**Figure 6.** Number of articles in different theme discussion

As it shown in Figure 6, the most popular discussed issue in 51 articles is the social awareness of disabled people. There are 28 articles indicate that the exclusion of disabled people in today’s digital world is caused by lacking of technical support and social attention. The second most discussed issue is the design of the technical products should be more universal and accessible to disabled users. There are 17 articles declare that most of the technology design is trying to fulfill the majority needs of non-disabled people, which have not taken disabled user into account. There are 11 articles declare that the employment issue for disabled people is one of the reasons prevents them from purchasing ICT or other assistive technologies. Most of the disabled people are living in poverty because they have difficulties to have jobs and their income level is lower than then average income rate. And, 9 articles indicate that the issue that the price of ICT
products is expensive and not all the disabled people can afford to buy and use them. 
There is an equal number of articles discussed the issues of: disabled people have to pay 
additional costs for their lives; the impairments of disabled people limited their access 
to technologies; and disabled people are lacking of technical knowledge. However, 
there are only 5 articles believe that form a good communication between disabled users 
and technology providers is important. And in 6 articles, they state that one of the 
reasons disabled people try to avoid using ICT because they do not feel confident about 
their technical skills.
5. Discussion

The purpose of this study was to find out the issues and problems that disabled people meet in the e-Society. A literature study was conducted by trying to follow the principles of systematic literature review method. The exclusion of disabled people by digital technologies makes their lives marginalized by the society. On one hand, disabled people are limited by their impairments, which lead the problems of owning and using technologies. One the other hand, the social phenomenon has not considered disabled people as part of the society, which caused the problems of lacking resource and lacking awareness in the accessibility issue of technologies for disabled users.

Governments, organizations, and communities should take the responsibility of including disabled people to the society, and try to advocate equal rights for disabled citizens. The common awareness of disabled people can improve their lives, for example, let companies and firms understand the importance of offering jobs to disabled people. And let manufacturers, industries and product designers to take disabled design as part of requirements. Governments should provide relevant support in ICT and assistive technologies, and organize ICT training centers for disabled people.

There are three limitations in this research paper. First, all the articles used in this research are from one publication database, which called “Taylor and Francis Online”. Second, there was only one reviewer in this research process, which is this thesis’s author. All the article selection decisions were made from this thesis author’s point of view. Third, the type of data used in this study is only research paper, without any other form of resource.

The recommendation for further research can be comprehensive and diversity using different forms of resource such as media, magazine, video or audio. Searching the solutions for responding the issues and problems disabled people are facing can be considered as the continual research of this paper.
References


Appendix A. Check list of questions for article selection

1. Is the aim of the article clear indicated?
   a. Does the aim of the article related to the purpose of this thesis study?
   b. Is the article aim to search answer about inclusion/exclusion issue on disabled people
2. Does the article list keywords relevant for this thesis study?
3. Do the research answers the research question?
4. What is the research method the article used?
5. How the research data collected?
   a. By survey? In which platform?
   b. By questionnaires? What are the questions?
   c. Interview? How the author/authors choose the interviewees?
6. How many people responded for the research?
7. What are the respondents’ backgrounds?
8. Is the data collection containing significant bias result?
9. Is there comparison in the study between different groups?
10. Is the measurement of the study well defined?
11. What is the scope of the study in the article?
    a. Is the scope too narrow or too wide for the research
12. Does the article indicate problems and challenges about disabled people?
13. Does the article mention the benefits or drawbacks of technologies to disabled people?
14. How the author analysis the data?
    a. Is the purpose of data analysis clear?
15. Are the research results reliable?
16. What are the limitations in the research?
17. Are the research results relevant to this thesis study?
18. Does the article mention at least one theme listed in this thesis?
19. How author conduct his/her literature study results?
20. Does the article fulfill the review protocol for this research paper?