INFORMATION AND COMMUNICATION TECHNOLOGY USAGE FOR HOLISTIC DEVELOPMENT OF CHILDREN WITH DYSLEXIA: A CASE STUDY

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ABSTRACT

Information and communication technology (ICT) usage among children has been increasing excessively in these days because of the portable devices, new life-styles and maternity ways. ICT usage and its effects towards the development has not been researched for the children with dyslexia. This study aimed to identify the positive and negative effects of ICT usage, as well as the perspectives of parents and teachers on ICT usage towards the holistic development of children with dyslexia. It was a single case study conducted in a private center at Kuala Lumpur which offers services to children with dyslexia. Three parents for children with dyslexia and their teachers participated in the study. The data was collected through interviews and document analysis. Atlas.ti, was adopted for the qualitative data analysis. Findings of the study revealed that ICT usage among the children with dyslexia had positive effects on the holistic development. It was seen that the children sustained longer attention, easy and fast learning, more confidence, and less struggles in reading and spelling. Moreover, ICT were good for language learning and for emotions sharing of the children with family and parents in addition to help to communicate with school friends while they felt better and happy. It was also seen that ICT kept children active when it improved their hand and finger motors. Nevertheless, the findings illustrated that the ICT usage had negative effects on certain aspects of the development of the children with dyslexia. Some children showed focus problem as ICT easily distracted them. Moreover, ICT caused mis-language usage and unwanted words in addition to the less interaction and communication with parents and peers as they preferred to use ICT in their spare time. The children had some emotional problems like throwing tantrum, bad and unwanted behaviors after using ICT in addition to the physical problems like less movement and problems in motor development. Furthermore, the parents and

teachers are advised to control and limit the ICT usage among children by balancing with other activities as they were aware of the benefits and harmful side of the ICT usage. The study concluded that the correct ICT usage among children with dyslexia is important because it has positive and negative impact on the holistic development of these children.

PENGGUNAAN TEKNOLOGI MAKLUMAT DAN KOMUNIKASI UNTUK PERKEMBANGAN HOLISTIK KANAK-KANAK DISLEKSIA: SATU KAJIAN KES

ABSTRAK

Penggunaan teknologi maklumat dan komunikasi (*ICT*) dalam kalangan kanak-kanak telah meningkat secara mendadak pada masa kini disebabkan oleh kemudahalihan peralatan, gaya hidup baharu dan kebiasaan dari lahir. Namun begitu, penggunaan *ICT* dan kesannya terhadap perkembangan kanak-kanak disleksia masih belum dikaji. Kajian ini bertujuan untuk mengenal pasti kesan positif dan negatif penggunaan *ICT* serta meneroka perspektif ibu bapa dan guru mengenai penggunaan *ICT* terhadap perkembangan holistik kanak-kanak disleksia. Kajian ini merupakan kajian kes tunggal. Ia dilaksanakan di sebuah pusat swasta di Kuala Lumpur di mana pusat tersebut menawarkan perkhidmatan kepada kanak-kanak disleksia. Seramai tiga orang ibu bapa yang mempunyai kanak-kanak disleksia serta guru-guru mereka terlibat dalam kajian ini. Data dikumpulkan melalui temu bual dan analisis dokumen. Perisian Atlas.ti digunakan untuk menganalisis data kualitatif. Hasil kajian menunjukkan bahawa penggunaan *ICT* dalam kalangan kanak-kanak disleksia mempunyai kesan positif umpamanya kanak-kanak menunjukkan daya tumpuan yang lebih lama, pembelajaran lebih mudah dan cepat, lebih berkeyakinan, mudah untuk membaca dan mengeja dengan mengaplikasikan penggunaan *ICT*. *ICT* juga membantu mereka untuk belajar bahasa dan berkongsi emosi dengan keluarga dan ibu bapa. Di samping itu *ICT* juga membantu mereka berkomunikasi dengan rakan sekolah dan berperasaan lebih gembira. Selain itu, *ICT* juga membantu kanak-kanak disleksia meningkatkan kemahiran motor tangan dan jari mereka. Namun begitu, hasil kajian menunjukkan

bahawa penggunaan *ICT* mempunyai kesan negatif terhadap beberapa aspek perkembangan kanak-kanak disleksia. Antaranya terdapat kanak-kanak disleksia yang memaparkan masalah tumpuan kerana *ICT* mudah mengalihkan perhatian mereka. Selain itu, *ICT* juga menyebabkan penggunaan bahasa yang salah dan kata-kata yang tidak diingini. *ICT* juga menyebabkan kanak-kanak disleksia kurang interaksi dan komunikasi dengan ibu bapa dan rakan sebaya kerana mereka lebih suka menggunakan peralatan *ICT* pada masa lapang. Mereka juga mengalami beberapa masalah emosi seperti mengamuk, tingkah laku buruk dan yang tidak diingini setelah menggunakan *ICT* tanpa terkawal. Selain itu, ada juga yang mengalami masalah fizikal seperti kurang pergerakan dan masalah dalam perkembangan motor. Oleh itu, ibu bapa dan guru dinasihatkan supaya mengawal penggunaan *ICT* anak-anak mereka dengan membataskan penggunaan *ICT* di samping mengimbangkan dengan aktiviti lain. Ini kerana mereka perlu menyedari tentang faedah dan keburukan penggunaan *ICT*. Kesimpulannya, penggunaan *ICT* yang betul dalam kalangan kanak-kanak adalah penting kerana ia memberi kesan positif dan negatif terhadap perkembangan holistik kanak-kanak disleksia.

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LIST OF SYMBOLS AND ABBREVIATIONS

AAP	American Academy of Pediatrics
APA	American Pediatric Association
AT	Assistive Technology
CWD	Children with Dyslexia
IDEA	Individuals with Disabilities Education Act
IEP	Individualized Education Program
ICT	Information and Communication Technology
IDA	International Dyslexia Association
IT	Information Technology
MCO	Movement Control Order

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In last two decades, technological developments have begun to affect lives of people in the whole world and have become a part of most people's lives (Lindstrand, 2002). Not only people use technological devices to access information, to communicate, to make easy their lives, but they also use these devices to entertain during their spare time and for more ways. In most parts of our lives like business, education and entertainment, technology has been using as the advantage and benefits to function on a daily basis (Shade, 1994; Haugland, 1997). In respect of education system, it has not been only used as material for teaching and learning, but it also has developed teaching and learning techniques. In today's classroom, students benefit from interactive learning techniques (Ahmad et al., 2012) thanks to the development in addition to teaching and learning materials around the learning environment. With the development and being a part of most areas in our lives, ICT usage time has been increasing. One of the previous researches shows American adults consume over eleven hours every day with interactive media (Nielsen Total Audience Report, 2018) while children spend more than 4 hours by using screen media in a regular day after they came home for entertainment, streaming video, checking email, etc. (Pew Research Center Data, 2018).

Today's children are earlier than past generation to use technological devices because they may meet with technology during infancy. Because of the characteristics of the cutting-edge technologies like portability and interactivity, parents use them to their babies occupied and entertain during the early childhood. (Radesky et al., 2015;

Haughton et al., 2015). For instance, most of the families use “baby sitter” during the daily routines to relax their baby or support children to sleep (Takeuchi, 2011; Vaala and Hornik, 2014; Nikken and Schols, 2015). After early childhood, new generation uses technology for their play/game and as a toy. Touch-screen devices like tablets and smart phones have become entertainment way for children thanks to the development in android and IOS technology. They have created applications for the devices to entertain, play and even to develop children developmental skills (Christakis, 2014).

Thanks to the assistive technology that is used for children with special needs to help most of the deficits, children with special needs also meet with technology earlier than ever in addition to daily usage of technology by themselves and their parents. For instance, parents who have children with dyslexia use early reading applications in smart phones and tablets during early childhood period to develop the reading skills or to make the children catch up with their peers before school age. In addition to creating an early educational environment, parents may use technological devices for child’s entertainment and relaxation (Nikken and Schols, 2015). That means parents give their mobile devices to children at home or outside to keep them silent (Chiong & Shuler, 2010). That is also one of the early exposures to technology by CWD.

The above-mentioned information shows children with and without dyslexia were exposed to technology from early childhood period to adulthood. This early usage may have an impact on the children development positively and negatively. American Academy of Pediatrics (2011) recommends zero-screen exposure in children below two years old while Tapscott (2009) mentions benefits of technology use and argues that children are more comfortable, knowledgeable, and technologically advanced than ever. In addition, Lerner and Barr (2014) mentioned the

benefits of watching high-quality educational TV programs may help the school readiness, social skills and language skills although Vandewater et al. (2005) mentioned children who are exposed excessively to technology with screen during early childhood are less to be able to read than other children in addition to deficits in social, emotional, cognitive, language and motor developmental skills.

1.2 Rationale of the Study

In the last decade, technology has changed the world, people's habits and most areas in our lives. It has not only changed the world, but it has become an essential need of most people in the last years. People from childhood to old age need to learn how to use technological devices in some areas. It is a fact that today children below one year old spend almost one hour a regular day by watching television while they begin to use parent's touch screen devices after five years old (Rideout, 2011). A child above seven years old uses computer quite a few times in a week to do homework or to entertain. In addition, technology covers most of life after school age for studying, communication and interaction, business and surviving in the digital age. That means technology usage has a great importance for all our lives and people should learn how to use it during childhood to catch up with rapidly changing world for their future. Because it has importance and has become a part of most people lives, the current study focused on effect of ICT usage among children.

With the development of diagnose in early childhood and the increase of importance in special education, the number of children who have diagnoses of "Dyslexia" has been becoming more. Only in the U.S., ten to fifteen percent of all school aged children is affected by dyslexia and fifteen to twenty percent of the US population evidence characteristics of dyslexia according to the IDA. Gomez (2004) conducted a research with 2000 pupils near Kuala Lumpur and saw about 7 percent of

them have dyslexia. Moreover, it is possible that 36 percent of student with attention-deficit and hyperactivity disorder have dyslexia. But, just 18 percent of them has diagnose of dyslexia in addition to their deficits (Christo et al., 2010).

Regarding the ICT usage among CWD, it can be seen that the usage begins early childhood period because parents who concern on the future of their children may introduce them a technological education environment by using assistive technology. According to International Dyslexia Association (2019), assistive technology (AT) is a tool to help children achieve task. It provides a way to demonstrate that task. Thanks to the development of technology, today plenty of applications are provided for children with special needs. As researchers and educators suggest using some of these applications, parents use them for development of their CWD from the early childhood period in addition to daily use. That means both daily and educational use of these technological devices have a huge effect on the development of CWD.

Early childhood is most crucial and fastest term of the development. Any delay or deficits in that period may cause bigger developmental problems for the later period of the life whilst success in early childhood development provides a strong foundation for the later process. This period is also a chance for children with special needs to struggle with the deficits and catch up with their peers. It cannot be denied that ICT usage in early childhood period influences the development of the children with and without special needs because they are use or exposed to technological environment because of the necessities of the time. Not only importance of the developmental process in that period but also the effects of the ICT usage towards the development are crucial for the future of children.

1.3 Statement of Problem

With the development of technology and spreading out all around the world in the last decade, lifestyle of the humankind has been changing rapidly without enough precautions against the negative outcomes. That has caused to uncontrolled technology use among children. According to research in the U.S.A of Common-Sense Media (2011), twenty-nine percentage of all families have downloaded applications to their mobile phone for their children to entertain. That means ten percent of zero-to-one, thirty-nine percent of two-to-four, and fifty-two percent of five-to-eight years old children have ever used one of these mobile devices. In addition to mobile devices, almost half of two-to-four and ninety percent of five-to-eight years old children have ever used computer. In addition, among zero-to-eight years old children, Screen time in TV/videos is 1:44 hour in addition to 0:21 hour computer activities and half hour for listening to music while they just read or being read to nearly half hour in a regular day. After a combination of the statistics for children and adults use for their children, it is clear that young children spend so much time by using technological devices.

In addition to early and more ICT usage by children, parents also use technological devices for a long time as a model for their children. That means parents teach excessively and unconsciously usage of technological devices in daily basis without deliberation as a model for their children (Schlembach and Johnson, 2014; Nikken and Schols, 2015; Aral & Keskin, 2018) although they should have the crucial duties for their children to teach and control usage of technological devices against technology addictiveness, suicide from interactive media and more damages of the technology (Kılınc, 2015; Ekici, 2016). According to statistics, ninety-eight percentage of adults in the U.S. from 18 to 29 years old and ninety-seven percentage of 30 to 49 years old adults use mobile device for email or accessing the internet while

they use social networks eighty-eight percentage and seventy-eight percentage respectively (Statistica, January 2018). In comparison, the ICT usage by individuals and households in Malaysia is almost same according to the Department of Statistics Malaysia (2017). In addition to being model to use technology, most families prefer to use technology during the infancy of their children to keep babies occupied (Rideout, 2011; Wartella, 2013). That means parental technology use causes children to meet technological devices earlier than ever.

Regarding parents' perspective on ICT usage during early childhood, they have been affected by the advertisement of IOS and Android applications. Parents tend to use technology for their children development in addition to maternal ways because they think it is beneficial during childhood (Parenting in the Age of digital technology: A National Survey,2013). The market has been becoming bigger day by day with vivid advertisement all around the online media, TV programs and outside ads. Moneymaking market may easily cover opinions of parents during challenging time of baby caring to help for delayed development of CWD because the statistics show most adults use technology more than daily routines and as much as addiction level (Pew Research Center, 2004; Cash et al., 2012). Moreover, family may prefer to use the technological devices for their children before the school age as technology is used as a part of special education system thanks to the assistive technologies designed for CWD. That means those who have children with dyslexia use technology for the development of their children from the early childhood in addition to daily use with their children. However, technology use by parents based on the advertisement for their children development or maternal way can be unconscious and cause negative impact on child development as well.

As a part of special education, technology is considered as an ultimate tool to support students with dyslexia because of the equalization learning opportunities and physical access in classroom (Demetriou, 2014). Therefore, educators prefer to use technology in the special education to assist CWD and that causes the further personal technology use habit. Because it is suggested that technology should be used like other traditional learning materials and early childhood activities by being integrated into all early childhood classrooms (Shahrimin, 2001) while teachers and school management encourage students to use assistive technology in education environment. That means it is inevitable to prevent CWD to use technological devices in daily life. Furthermore, teachers have more positive thoughts on ICT usage for CWD as they think it helps their development and has positive impact on negative classroom behaviors (Young, 2013). As adults and teachers use it as a part of their educational life, either children have to be exposed technology, or they would want to use it to spend spare time or so on after educational purpose.

Comparing the ICT usage among typical children and children with dyslexia, children with dyslexia are exposed to use assistive technology in addition to daily ICT usage. As mentioned by Demetrio (2014) that technology is used as a supportive tool for equalization learning opportunities and physical access in classroom of students with dyslexia, parents and teachers prefer to use assistive technology for development of CWD. Eventually, children with dyslexia are exposed more ICT devices than typical children with dyslexia. Furthermore, comparing typical children and children with dyslexia, most of children with dyslexia have undeveloped time-management skill (Reid, 2009). While typical children manage their time of ICT usage by balancing with other activities, undeveloped skill of children with dyslexia causes excessive ICT usage if parents do not control their ICT usage.

In the last a few years, technology use shapes to portable ones with the development of smart phones, android and IOS tablets, and other portable devices while people had to sit most of times to use a technological device in the past. That means children can access these portable devices in every place they are whereas it was not possible with past devices. Concerning on the literature, resources are more about the effects of the unportable technology use like computer and television. This is a lack of the literature because it should catch up with the speed of the developments. Otherwise, effect of television screen time and mobile phone screen time may have different impacts on children because one (TV) may easily control by adults while other (internet) has limitless content. Therefore, literature should focus on also the current devices to find out exact impact. In addition, resources on the effect of ICT usage among CWD, early ICT usage, negative impact of ICT usage among CWD are limited while a few researches focused on the effects during the early childhood period for mainstream children. That is why the current study not only explored the positive effect of ICT usage but also focused on the negative effects of ICT usage for the development of CWD.

The increase of the accessibility to technological devices increases their effects on our life. Especially, the new generation is growing with the technological devices and spend their time in front of screen. Besides the benefits of the devices, some problems on the children development are seen by parents and educators such as reduced development of social skills, obesity and drowsiness. The context of apps, videos, video games etc. may also affect all aspects (cognitive, social, emotional, physical, moral, personality and adaptive) of development in early childhood because they are parts of the new generation's lives. According to literature, ICT usage during

early years has both negative and positive effects on children development. However, there are less study on the effects of ICT usage for the development of children.

1.4 Research Purpose

The purpose of the study is to explore the positive and negative effects of ICT usage for the development of CWD in order to make ICT usage more beneficial and help parents and teachers to see the effects as controller and supporter on their children's ICT usage. While the study explores the positive effect of ICT usage on development of children, it also focused on the negative effects. Depend on the effects of ICT usage on development of CWD, educators and parents may prefer beneficial ones for the children. Being aware of negative effects in addition to the positive ones may also help to create more useful technology for children or show how to control ICT usage by educators, parents and nurses.

The study also aims to find out the perspectives of parents and teachers about ICT usage by the children to understand negative and positive views on technology during childhood and the reasons of them. That may help the study to see why teachers and parents use/do not use technological devices for the development of CWD during early childhood. This shows the natural outcomes of the ICT usage by the children and may contribute the study to see the reasons why teachers and parents encourage or prevent children to use technological devices in educational environment and daily life.

1.5 Research Objectives

1. To identify the positive effects of ICT usage for the holistic development of children with dyslexia

2. To identify the negative effects of ICT usage for the holistic development of children with dyslexia
3. To explore the perspectives of parents on ICT usage for the holistic development of children with dyslexia
4. To explore the perspectives of teachers on ICT usage for the holistic development of children with dyslexia

1.6 Research Questions

1. What are the positive effects of ICT usage for the holistic development of children with dyslexia?
2. What are the negative effects of ICT usage for the holistic development of children with dyslexia?
3. What are the perspectives of parents on ICT usage for the holistic development of children with dyslexia as a whole?
4. What are the perspectives of teachers on ICT usage for the holistic development of children with dyslexia as a whole?

1.7 Significance of the Study

Information and communication technology use among children has been increasing excessively in these days because of the portable devices, new lifestyles and maternity ways. ICT usage and its effects towards the development has not been researched for the CWD although just a few mentioned impacts of ICT usage for mainstream children. The gap in the literature causes the lack of information on the effects of ICT usage for the development of CWD. This is crucial because ICT usage has impacts on childhood development and all later developmental process of children. Moreover, previous studies on ICT usage have focused on more positive effects while

ICT usage has also negative effects. That is why the current study focuses on both positive and negative effects of ICT usage among CWD.

Result of the research showed how ICT usage among the CWD play their roles in children's developmental process. This may help parents to see whether or not ICT usage by their children is beneficial on their development. Depending on the results, parents can plan ICT usage for their children. Moreover, it may help to change some perspectives of parents on ICT usage for their children during childhood because some has only positive opinions to use it because of the advertisements and being easy way to occupy babies. Specified effects of ICT usage for CWD may help parents to see differences between children with and without dyslexia on ICT usage in order to choose the best technology for their children.

One of the places where the children use technology is school. Teachers prefer to use technology to assist CWD from the early childhood. However, despite of the beneficial applications and technological devices for the children, there is not enough information on the effect of technology on developmental process for CWD. That is why selecting proper devices for the children may be difficult for educators for CWD. The current study aims to show both positive and negative effects of ICT usage in order to create an environment where the children benefit from the technology more effectively.

1.8 Limitations of the Study

Generalization of the study result is one of the limitations of the research as a qualitative research. This is because the study depends on personal opinion by parents on ICT usage among the children and teachers' perspective in some area. It is possible that parents may offer only their positive opinions on their children and that may cause

wrong data collection as a bias even though this can occur that they had agreed to offer unbiased opinions and information in the interview procedure. In addition, the limited number of samples for ICT usage by CWD is also limits the generalization of the study.

Like most of the researches, time is a big limitation to research on negative effects of ICT usage for the development of CWD because it takes time to collect enough data and access to enough students. Because of the time limitations of parents and teacher, it may be difficult to explain the exact effects of ICT usage by parents or to collect enough information on development of children by teachers. Both from / parents and researcher side, limited time may affect the result of the study. Therefore, time is seen one of the limitations for the current study. In addition, despite some parents speak in English comfortably, some may not feel comfortable to give enough data on the effects of ICT usage among the children as English is their second language. The problem may cause the result of the current study.

In addition, developmental documents of the CWD is based on teachers' opinions and documentations. Lack of the documentation on the development of the CWD by teachers means the lack of the effects of ICT usage on development of the CWD. This may cause mistake on negative and positive effects and may directly change the result. Only interviewing with teachers and collected documents by teachers instead of observing students on development for a long time may not be enough to introduce fully correct data. That is why the collected academic documentation and interviews may directly affect the results of the research.

1.9 Operational Definition

The terms of this study are defined in this section. As the definitions of the terms may have some differences conceptually and operationally, the conceptual and operational definitions of the terms are shortly mentioned.

1.9.1 Information and Communication Technology (ICT) Usage Technology is machinery and equipment developed from the application of scientific knowledge (Oxford Dictionary, 2019). Depending on the usage, there are several types of technology. ICT refers to all technologies that provide access to information through technologies such as internet, wireless networks, cell phones, smart phones, computers, tablets and other communication mediums. In this study, the term of information and communication technology usage refers regularly ICT usage among CWD and the exposure of ICT onto the children by others like parent, siblings or environment. For example, watching TV during nursing school and using smartphones and any screen devices by parents to keep baby occupied. ICT usage by the children also includes usage of interactive media and screen devices regularly and excessively.

1.9.2 Holistic Development Development is the process to grow or change and become more older depending on different developmental milestones like cognitive, language, social, emotional, and physical from the prenatal period to death (Cuceloglu, 2016). It is the product of genetic and environment by containing growing, maturing and learning (Yesilyaprak, 2004). Development is not be calculating with numbers like growth, but it is a combination of different structures such as growth, maturation and learning. The term of holistic development is used to see comprehensive process for the children development. That means not only focus on one development aspect it focuses multiple aspects of the development.In this study, the term is used to show the

process for the cognitive, language, social, emotional, physical development of the children who are exposed the technological devices during childhood as these aspects of development are crucial for seven-to-nine-year-old children with dyslexia.

1.9.3 Children with dyslexia The term refers a group of children with reading disorder and recognized under the specific learning disability distinguished from other learning disability because of its weakness occurring at the phonological level. Dyslexia is considered by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities in addition to the problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (IDA,2003). In this study, the term of children with dyslexia refers seven-to-nine-year-old children with dyslexia who had used ICT devices regularly.

1.10 Summary

Research on the effects of ICT usage for the development of CWD is a need of today's generation because most of the children use technology during daily life and education. Despite the unknown part of ICT usage, it has been increasing with the development of technology and moneymaking applications market. Percentage of people who regularly use technology and the amount of daily usage are in incredible level. That is why the study is focuses on ICT usage among the children. In addition to current unclear information on effect of ICT usage among children, the study aims to clarify the effects on development of seven-to-nine-year-old children with dyslexia.

The study illustrated not only the effects on children development but also it aims to help parenting and teaching styles on the attitudes of ICT usage among the children. That means the study may affect the ICT usage among parents as a maternal way and use among teachers to assist children to struggle with the deficits.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, a review of the literature on ICT usage among CWD and effects of it towards the development of CWD. Key terms of the literature (dyslexia, early childhood development of dyslexia, ICT usage among CWD, assistive technology and dyslexia) was searched in databases of Education Research Complete and Psychology and Behavioral Sciences Collection at EBSCOhost through the University of Malaya online library. However, the databases did not have enough researches for CWD over 5 to 10 years. Therefore, literature review was enlarged to specific use of technology (tablet, smartphones, TV, Internet/multimedia etc. screen time and dyslexia/children with learning disorders…) and enlarged with technology usage of children without dyslexia.

In the review, some researches older than ten years are incorporated because of the dearth of more recent research on specific gaps concerning ICT usage among CWD. The chapter includes definition of dyslexia, early childhood development, theoretical framework, related phases that represent the past studies and conceptual framework.

2.2 Related Theories and Models

Having theories on the current study helps to understand clearly terms and concepts about the ICT usage and its effects on development. In order to clarify and have a strong basis for the research, Erikson's Psychosocial Development Theory and Bronfenbrenner's Ecological System Theory are partly mentioned in this section. While Psychosocial Development Theory helps to understand the personal

development of CWD and effects of family attitudes and child's experiences towards the child personality process, Ecological Development Theory summarizes how environmental factors have the effects on the whole developmental milestones of CWD during the time.

2.2.1 Erikson's Psychosocial Development Theory

Early childhood period for the babies is critical for the child development and early support and intervention may help the development to reach the maximum point (Avci, 2003). Erikson emphasized that there is a sociocultural and biological tie in child behavior (Avcu, 2015). Psychosocial Development Theory argues that social environment of children affects their behavior at crucial stages. Erikson (1950) emphasized the connection with personal maturing and social environment during the stages. He divided the psychosocial development to eight stages. These stages are Trust vs Mistrust (0-18 months), Autonomy vs Shame and Doubt (18 months-3 years), Initiative vs Guilt (3-5 years), Industry vs Inferiority (5-12 years), Identity vs Role Confusion (12-18 years), Intimacy vs Isolation (18-40 years), Generativity vs Stagnation (40-65 years), and Integrity vs Despair (65 and older) (Elkind and Donmez, 2019; Syed & McLean, 2018; MEGEP,2013).

Because the research is focused on the seven-to-nine-year-old children with dyslexia, the study focused on the first four stages. During the first stage, trust vs mistrust, the child develops a balance trust and mistrust depending on the caregiver. While feeding and caring well improve a healthy trust, neglect, abuse or cruelty increase the emotion of mistrust. An order and comfort for baby during feeding, sleeping and daily caring form the first sign of the social trust in the infant (Gursel and

Kilavuz, 2016; Elkind and Donmez, 2019). During the period, mother has big importance for a successful balance of the trust and mistrust feelings.

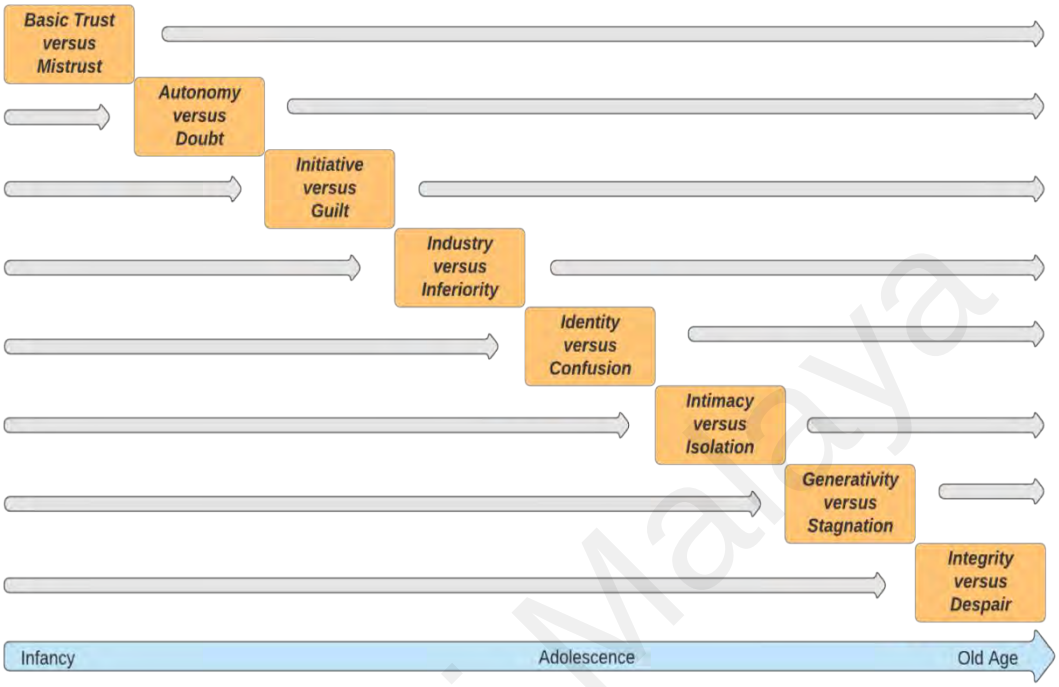

Figure 2.1. **The diagram of Erikson's Psychological Model (Syed & McLean, 2018)**

Autonomy vs Shame/Doubt is the second stage of the development. In that stage, child begins to be aware his own behaviors and struggle with personal control. Sense of independence occurs with the physical and cognitive development of the child. If parents try to control all the actions of child, child may doubt on his own skills and eventually feeling of shame may occur. However, if the child is allowed to explore his environment and is supported, the feeling of autonomy will gain (Gurses and Kilavuz, 2011; Elkind and Donmez, 2019). In the stage parents' patient and encouragements are important for child development and success.

Third stage is more related with the being independent and initiatives by child. Sense of purpose begins to develop in that stage and child tries to do something on his

own According to Erikson (1964), valued goals create a balance of initiative and guild. He also identifies game and imagination as part of children life that they learn from themselves and their social environment. Preventing them doing something new will develop the sense of guilty and fear of being wrong or unapproved. The fourth stage (Industry versus Inferiority) is the stage that child can play games by obeying the rules and has reasoning skill deductively. According to Erikson, the outcomes of the social interactions in that ages are industry versus inferiority. Attempt to create something, to join activities or to do anything should be encouraged by the adults to improve the feeling of dexterity. Otherwise, the feeling of inferiority grows (Elkind and Donmez, 2019).

In these stages, Erikson defines challenges for the individual based on cognitive, emotional and social issues (Beresin et al., 2012). He also mentioned developmental crises that takes place at certain stages based on the physical, psychological, environmental and social capacities of each child. Consideration on ICT usage among children, they are using technology depending on their parents and their environment during early childhood (Beresin et al, 2012). While technology provides them an endless opportunity to build new skills and discover new information for children, it may affect children's physical, psychological, environmental and social capacities. When they begin to learn their environment and control their own behavior after second stage, today's ICT usage among children may provide children to develop self-confidence. For the current study, Erikson's Psychosocial Development Theory helps to see how social environment affects the child behavior in addition to the family attitudes on the child personality (Erikson, 1950). The theory shows that the perspective of family is a part of ICT usage of CWD. Moreover, it can be understood from the theory that controlling and encouragement by the parents affects the

development of the children. That is why the study interviewed parents on the ICT usage for the development of CWD by gathering the information whether they control or encourage the ICT usage.

2.2.2 Bronfenbrenner's Ecological System Theory

Proximal process, Person, Time and Context are four components that affect the developmental outcomes of competence and dysfunction (Jackson et al., 2006). *Proximal processes* are the primary engines of development (Bronfenbrenner and Morris, 1998). Family-children relations, performing complex tasks, group-play and learning a new skill. Effective proximal processes must include some activities on a regular foundation over an extended time (Jackson et al., 2006). The *Person* encompasses forces, resources (e.g., genetic defects, illness, abilities, experiences), and demand (i.e., physical attractiveness and personality). The component of *Time* helps to understand intra-individual reliability, variability and change across many events and many cases of the same event. Microtime (minute-by-minute exposure), Mesotime (days and weeks), Macrotime (e.g., life span, generations) and Chronosystem (environmental events, transitions, socio-historical circumstances and conditions) are under the *Time* component.

The Ecological System Theory (1979,1989) provides a comprehensive resource on environmental influences on human development with interrelation among four different *Contexts* (environment); *microsystem, mesosystem, exosystem* and *macrosystem*. These nested and inter-linked environmental systems have bi-directional effects within and among layers (Bronfenbrenner, 1979; Johnson, 2010). For child development, the individual characteristics like age, gender, well-being are the first layer to consider on as they affect the development directly. Moreover, experience is

important for development as the individuals are thought as an active agent (Bronfenbrenner, 1981). Microsystem is the first context that The Person has an active role in and that based on the interaction among person and immediate environment such as family, friends, neighbors and peers. The mesosystem is inter-relationships between two or more microsystem like home and school experiences. The exosystem is a social setting that the Person is not active, but the settings affect his experiences in immediate context such as parent's workplace, mass media and national organizations. The last context is macrosystem that includes attitudes and values of individuals, local regional, national and international cultures.

Regarding the ICT usage among children and its effects on children development, the Bronfenbrenner's ecological system theory provides a framework to understand the effects of technology use on the children development. The interaction among Person characteristics, Proximal processes and Context influences the development over the Time. Therefore, to understand the effects, ICT usage among children should be measured both the aspect of quantitative and qualitative dimensions as well as the consideration of children characteristics, contextual factors and time (Jackson et al., 2006).

Although Bronfenbrenner (1977) defined the Internet revolution and development of the technology (e.g., television) was conceptually in the microsystem, Johnson and Puplampu (2008) proposed the techno-subsystem (Figure 2.2) in the microsystem (Heider, 2015). That contains the interaction of children with human and nonhuman elements of information, communication and recreation digital technologies. The children's microsystems (home, school and neighbors) are already affected by Internet and technology (Johnson, 2010). For example, children

communicate online with their grandparents and peers. Even, parent use of internet at work (exosystem) may affect indirectly ICT usage of children at home. As an example for the macrosystem, the development of the country influence the types of technology that are used by children. For example, children who live in undeveloped countries watch more TV while those in developed countries spend their time in front of touch-screen devices.

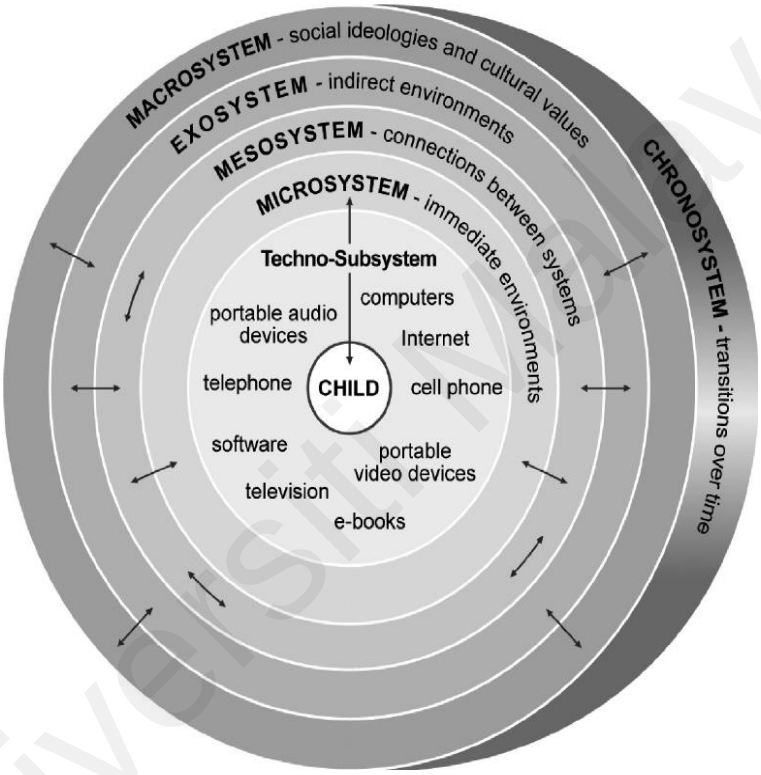

Figure 2.2. **The Ecological Techno-Subsystem (Johnson & Puplampu, 2008)**

Bronfenbrenner's theory explains the location of technological devices in the development of CWD. As it is shown in Figure 2.2, ecological techno-subsystem is in the microsystem (immediate environment) where children interact firstly like their parents and it may easily affect the child development. For the current study, the theory helps to understand that personal characteristics of CWD are in the center of the development whereas family and technological devices in microsystem come next for the development of children. The theory helps the research to choose sampling of the

study and to determine the environmental factors that have the effects on the whole developmental milestones of CWD during the time. That is why researcher determined to analyze children's daily ICT usage from the perspective of parents and teachers.

2.3 Theoretical Framework of the Study

In order to summarize the above-mentioned theories and their impacts on the perspective of the current study, the main points of the Erikson's Psychosocial Development Theory and Ecological System Theory was combined in the theoretical framework (Figure 2.3). Social environment, parents and child experiences are main factors on the child development according to the Psychosocial Development Theory.

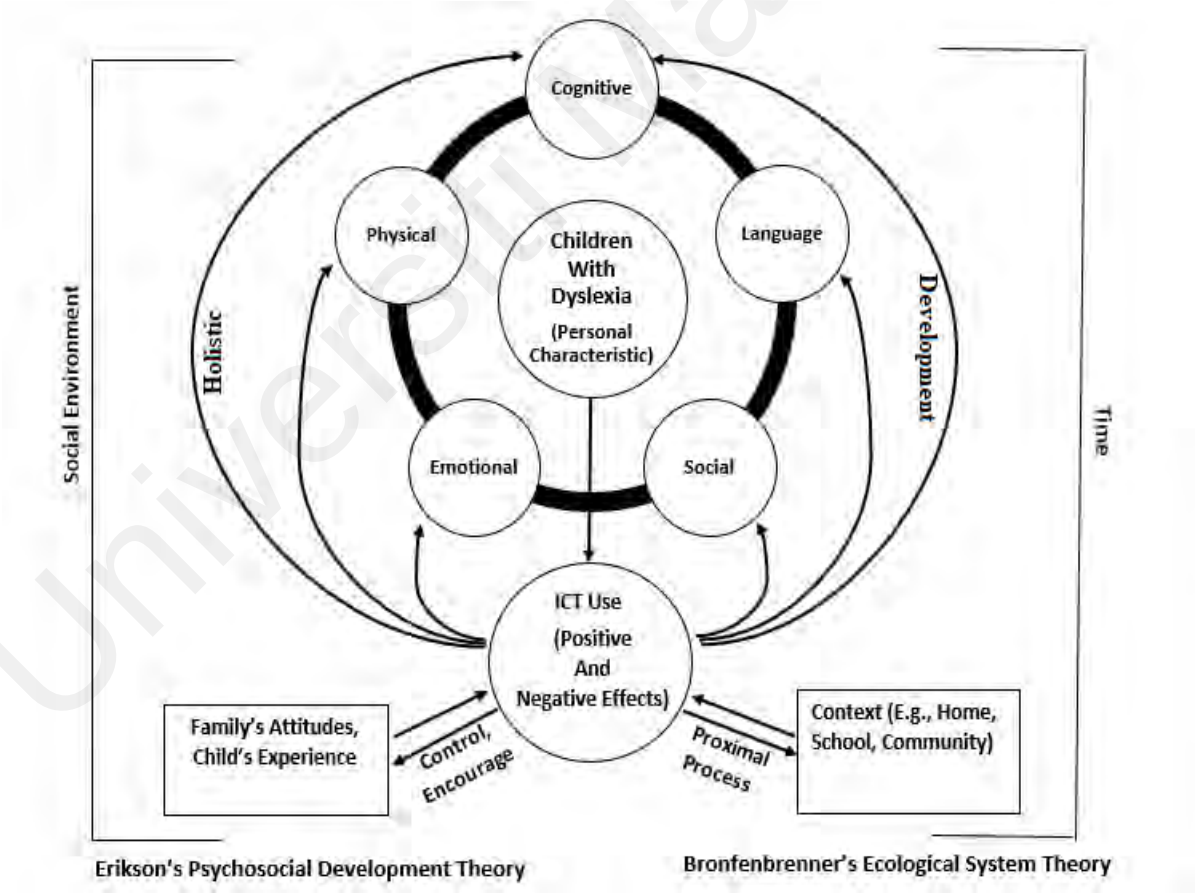

Figure 2.3. **Theoretical framework of the study**

These factors affect directly and indirectly the child development. Moreover, control and encourage by parents on ICT usage among children have impacts on the child development.

The Ecological System Theory is more focus on the environment of child during the developmental process. Contexts influence ICT usage by children while they may be affected depending on the use. Moreover, person characteristics like illness and genetic deficits or abilities and past experiences directly affect development as well as the ICT usage by children. All the context from micro to macrosystem should contain the processes that happen over the time that is a one of the components of the theory.

2.4 Dyslexia

The group of children who are studied on in that research have dyslexia. To understand the research well, some definitions of dyslexia term and the characteristics of the CWD are introduced in that part.

2.4.1 Definition of Dyslexia

The definition of dyslexia comes from the combination of "dys- 'difficult'" (German) and "lexis 'speech'" (Greek). The disorder involves difficulty in learning to read or interpret words, letters, and other symbols, but does not affect general intelligence. According to James Hinshelwood and Dr. Morgan, it was word and letter blindness in 1896 (Guardiola, 2001). However, Liberman (1991) defined it as a difficulty in phonological processing problems (Fletcher et al. 2007). One of the today's definitions of dyslexia by the International Dyslexia Association (2016) is:

> *"Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language*

that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge."

It is also defined as a reading disorder under the specific learning disorders instead of reading disability by American Psychiatric Association in DSM-V (2013). The term of dyslexia has been debated but the main symptoms are agreed on by the researchers (Snowling et al., 2011). That has been changing from intelligence level to phonological processing (Berget, 2016). After DSM-V, the term of "Dyslexia" is just a clinical term while it is used a specific learning disorders in educational environment.

Depending on DSM-IV criteria, the prevalence of dyslexia was 5 to 10 percent of any population (Ahhissar,2007) and 15-20 percent of the US population evidence characteristics of dyslexia according to the IDA (2002). In DSM-V, the APA (2013) reports that the prevalence of specific learning disorder from different languages and cultures is 5-15%, while the prevalence of reading disorder and mathematics disorder is 4-9 and 3-7 percentage, respectively. Moreover, DSM-V shows that the prevalence of specific learning disorder for boys is two to three times more than girls. Features of dyslexia may be different depending on the children (Snowling, 2011) such as slow but accurate readers or fast but inaccurate readers. In addition to reading and writing problems, attention deficit and challenging behavior may be had by the student with dyslexia.

2.4.2 Characteristics of Dyslexia

The deficits in spelling, reading, simple calculation, and reverse reading/writing are the most common traits in most of the CWD. Other symptoms are including poor phonological memory, processing and vocabulary, directional

confusion and poor mental calculation (Rauf et al., 2018). Tops et al. (2013) mentions the individuals prefer to read quit and have poor handwriting. According to Parhiala et al. (2015), these deficits cause social skill deficits and short concentration span and result in problems in educational instructions. Furthermore, lack of success because of the dyslexia made them suffered from low self-esteem (Hamid et al., 2015).

According to British Dyslexia Association, CWD in preschool have also some possible indicators of dyslexia. They have difficulties to learn nursery rhymes, songs or alphabet in addition to the deficits to keep rhythm. They find hard to understand two or more instructions at one time as well as a slow speech development history. Deficit on wearing clothes without help, wearing shoes and choosing correct shoes for foot, tripping and falling while walking, deficits of keeping throwing and hitting ball are also other difficulties in movement and balance skills (British Dyslexia Association, 2019).

2.5 Information and Communication Technology (ICT) Usage

The Merriam Webster Learner's Dictionary defines technology "the use of science in industry, engineering, etc., to invent useful things or to solve problems" and "a machine, piece of equipment, method, etc., that is created by technology.". Today, there are several concepts to describe the technology use; digital technology, interactive media, information technology (IT), information and communication technology (ICT), educational technology and assistive/adaptive technology (AT). Today's generation can access range of technological devices for daily basis around home, school and outside. The evolution of the technology has changed both usage purpose and its frequency. This use of technology is not only used for daily activities today, but it is also a part of the educational system. According to Laurillard (2012),

technology is important drivers for education though technological devices are not developed for the educational purposes.

Regarding the daily use of technological devices, people use television, computer, smart-phone, tablet, media player, electronic household goods, etc. in order to entertainment, streaming video, checking email, online shopping, e-reading, listening, watching, sharing, chatting, playing video-game and so on. (Pew Research Center Data, 2018). According to the research, people spent almost half day by using technological devices and as online in social media. Not only children use these devices excessively but also their parents are use it. Even though the devices and types of use may change depending on the economic and educational statue, the usage time is almost same. The use of parent and immediate environment affects the children's current and further use of technology. For example, it is possible that the children are exposed to more technological effect in at home all day television on in background even if nobody watches it.

2.5.1 The role of Parent in Information and Communication Technology (ICT) Usage among Children

As researches show ICT usage of both adults and children are in the level of addiction, parents should have responsibilities to control the usage. However, controlling the use of technological devices is not easy today because portability in the devices is improved and smart-phones have taken the place of computer, laptop, television and more interactive media. While it was easy to control children's Internet use in laptop and computers, it is almost impossible today to control use of internet in smart phones except some family platforms in the devices.

According to Kantarci (2018), some families prefer and support children to use technological devices because ICT usage do not make them very active, sweated or far from home. This kind of attitudes by parent makes children more addictive to use technology. She also argues that children may totally adapt the virtual environment because their parent is also under the effects of the technology addiction. This may cause the social and emotional problems like estrangement of children. that is why it is important to control technology use of children (Caliskan & Ozbay, 2015).

2.5.2 Information and Communication Technology (ICT) Usage in Education

Educational technology is any technological device or new electronic technologies that are used for educational settings and aim significantly to improve the education (John, 2015). Lesson planning and organizational tools, electronic research tools, tools to support specific content areas, tools to record class lectures and course materials are some examples for the educational technology. Over the past two decades, technology is actively used in technology to improve the productivity of the lesson. It is ranged from one computer for a classroom to computer labs and now to easily access online and interactive classroom. Because of these developments, it is expected that schools and educators should use technology sufficiently and train successful individuals (Cure and Ozdener, 2008). However, according to Ritzhaupt et al. (2012), schools cannot always maintain the development in access to devices, professional improvement, and onsite educational support.

Information and communication technologies provides an enjoyable, advanced education environment to learn information fast and directly. Children keen on to learn and join the lesson thanks to the devices. Technology in education improves the accessibility and quality of learning, reduces the cost of education, adapts the change

in life and provides children skills that they need over their lives (Bakla et al., 2017). According to Korkmaz and Usta (2010), effective technology use by teachers and teaching this skill to children are very important in this technology age. It should be used depending on purpose by regulating the topics, content, techniques and organizing time, program, environment depending on the personal differences. This ensures an active and student-centered education.

2.6 Early Childhood Development

Early childhood is a critical period for the development process for all essential skills. Researchers argue that early childhood development shapes the further personal characteristics, belief, habits and value judgment. This period also the fastest developmental process for the children and the capacity is in the peak during the early childhood (Oktay, 2006). Early childhood development consists of different milestones to determine the development's level. Moreover, early childhood period is the best time to assess CWD and for intervention (Boets et al., 2011). According to Drigan and Elektra (2016), speech perception and preschool impairments in auditory processing help to determine future reading problems. Therefore, the period has a crucial role to develop the deficits for the children with special needs. As this study focused on holistic development of the CWD, different aspects of development (cognitive, language, social, emotional, and physical) were mentioned in further section to identify the developments of children. The aspects of development were chosen based on common problems on the age group of CWD.

One of the milestones of the early childhood development is cognitive development. In early childhood, cognitive development is in fastest time comparing the further age period. Cognitive development begins after birth and continues to

develop by laminating new information through the whole life. The term of "cognitive" means brain based mental actions like sense, perceiving, imagination, remembering, recalling, problem-solving and thinking (Zhang, 2019). Moreover, mental abilities like correlation among different situations, analyzing, making synthesis, learning new information and adaptation new conditions are just possible with cognitive development. According to Yavuzer (2019), cognitive development contains all the mental process that includes understanding, recognition and learning the life.

Another milestone of the early childhood development is language development. Language is a complicated and traditional system that occurs combinations of different symbols and are used in a rule. It is a window for the children that helps them transform their own knowledge and emotions to social environment (Aydın et al, 2014) and learn more thanks to this skill. In order to speak, other organs should be developed enough because the action occurs with the correlations of several organs in child body (e.g., tongue, respiratory system, vocal cord). Language skill is very quickly developed during early childhood. First word is spoken by children around 1 year old while they can combine two words around one and half year old. Then, multi-words and grammatic rules are used in language skills about three years old (Berk, 2019). Children begin to communicate with telegraphic speech and in a short time they improve the elements of speech. Children may use more complex vocabularies and grammar until the end of early childhood.

For the social development, adaptation of social rules by shaping the personal characteristics and interacting with the social environment throughout the life are defined as social development. Child should mimic behaviors whose he can take an example for his life. A successful social adaptation brings with successful life for the

children. First social development is the first meeting and communication with mom. Confidence in this age is important for the further social life of children. If they feel that they can trust people around them, they begin to make friends around two years old (Gunindi, 2010). They may empathy in some conditions and understand what their friends feel. They develop the sense of imitation, embarrassment, competition, attracting attention and grudge after two years old (Oruc, 2010). Game is very important to be social around three years old because children set social connection with others during game. During the early childhood, children explore their environment more and they are more enterprising according to Erikson's psychosocial development theory.

Emotion is a functional psychological system that involve the synchronic interplay of several components (appraisal, expression, body regulation, and feeling) that serves to regulate the actions in the individual action system in line with that individual's motives and concerns (Holodynski, 2013). Thomson (2001) defines the emotion as color of life experience for people of all ages. He mentions that emotions motivate young children because engagement and withdrawal from events are based on emotions in quality. This is because the growth of social competence, intellectual achievement, self-understanding, and the earliest origins of mental health or psychopathology are controlled by emotional development (Barrett et al., 2018). It helps to understand the growth of the children' psychology because emotions show behavioral ability, social situations, experiences of relationships, self-understanding, and personality growth of children (Thompson, 2001). Children in early childhood ages learn to control their emotions by following how adults control their emotions and mimic them.

Physical development is the change in the human body like the growth of height, weight, organs (e.g., leg, arm, lung). It is easy to calculate and observe physical development comparing the other milestones. This development may be different depending on the genetic and environmental factors (MEGEP, 2013). Regarding psychomotor development, it is the ability to control the use of physical features with physical and cognitive development over the time. Gross motor skills are better than fine motor in the first years. Gross motor skills are more related with large muscles of the body for daily routines like walking, playing and sitting on a chair. This skill is thought as an important development process of early childhood while fine motor skills let them to take responsibilities for their own daily life (MEGEP, 2013). They are the uses of small muscles like hand-eyes coordination like eating foods, pouring milk into a glass, pushing a button and drawing pictures. During early childhood, child body changes visibly and general appearance of the body is similar to one of adults around six years old. While children can easily run and jump during this period, they have difficulty in performing skills such as button-up and using scissors. This is because gross motor development is faster than fine motor development (MEGEP, 2013:2).

2.7 Review of the Past Studies

In order to understand the past studies on ICT usage among children and the effects towards the development, literature is reviewed under some specific titles of parents' perspective on ICT usage, early exposure of children towards the technological devices, effects of daily technology use among children, and ICT usage among CWD. This may help to access more information about the ICT usage and its effects for children in different perspectives and different areas that related with main issue.

2.7.1 Parents' Perspective on Information Communication Technology (ICT) Usage among Children

Because children are still dependent to use technological devices, parents' view on ICT usage by the children may influence the usage way, frequency and even the effect of ICT usage. While some parents encourage their children to use technological devices some have concern on the usage for the children's development. Genc (2014) conducted a research on parents view on ICT usage and found that almost 45% parents have negative feeling, nearly 25% feeling positive and almost 27% feeling neutral on Smartphone use by children.

Most of the parents thinks ICT usage among children has positive impact on the cognitive, language, social/emotional (Yalcin and Erden, 2018) adaptation to the technology and improvement of visual memory (Genc,2014). Moreover, some parents argue the usage improves their children's empathy, sharing and respect among siblings. However, physical and mental problems, isolated lifestyle, harmful radiation (Genc,2014), bad attitudes, addictiveness, language and speaking disorders (Yalcin and Erden, 2018) are some concerns of parents about ICT usage among children. In the research of Aral and Keskin (2018), almost seventy percent of interviewed parents controlled the usage of their children as following and limitation by parents may decrease the negative usage of technology among children according to Carlson et al. (2010).

Some parents also look the usage neutral because they use technological devices as much as their children. The overuse of technology by parents also causes nonverbal communication between parent and child. Furthermore, parental media use is a good forecaster for technology use habit of children (APA, 2016). According to

Rideout (2011), almost thirty percent of parents have mobile applications for their children to use. Half of the parents use technology as a babysitter that means they let their children to use devices when they do housework.

2.7.2 Early Exposure of Children towards the Technological Devices

American Academy of Pediatrics (AAP, 2016) introduced guidelines on the current issue of mobile and interactive technology use that highlight some context for caregivers and providers to use screen time effectively for children. The report (2016) highlighted that parents should limit media use of children to about one hour in a day in a parent-child shared media use plan and encourage children social activities or parent-child interactions.

The prevalence of technology used in home contributes to the technology use frequency. According to Karin (2017), infants and young children are increasingly becoming exposed to screen-based devices. Karin also found that multiple technological devices are used in home environment. As a result of this, the average use of screen time by almost ninety percentage of children below two years old is almost one hour a day (Rideot, 2013; Zimmerman et al., 2007). Almost seventy-five percent of them watch educational programs, while the percentage of children watching entertainment and adult programs are forty-five and fourteen respectively. Moreover, sixteen percent of children below two years old had a television in their own room (Rideout, 2013). In addition to TV use by children, just five percent of parents mentioned they do not have educational games or programs on their devices for the development of children below one year old (Rideout, 2013).

According to Karin (2017), almost ninety percent of children below two years old had used screen-based mobile devices. Moreover, ninety-five percent of them had

watched TV while more than seventy-five percent had used applications (Kabali et al., 2015). Rideout (2013) mentioned forty-three percent of two-to-four years old children play educational games whereas the forty-seven percent are watching videos and thirty percent are using educational ones. Thirteen percent of infants use mobile devices for educational games while fifteen percent of those play fun-games in mobile devices. Moreover, nineteen percent of infant use creative applications in the phone whereas thirteen percent of those watch television according the research.

2.7.3 Effects of Daily Technology Use among Children

Because the past studies on technology use have focused more on one aspect positive or negative, review is divided two parts: the positive effects of technology use on children and the negative effects of technology use on children.

2.7.3.1 The Positive Effects of ICT usage on Children

Hsin, Li and Tsai (2014) mention that technology use among children improves their collaboration and interactions with peers while they are playing multiple player video games although some researchers argue children should be avoided to use technological devices as they isolate the children and negatively affect their social skills. They found that the games encourage children to communicate in order to complete the task. They learn useful information thanks to active interaction with their peers in the computer area (Björk-Willén &Aronsson, 2014: Lim, 2012). Moreover, technology use at home facilitates parent-child interaction. Researchers described it helps children to learn how to interact with an adult in order to achieve a common goal. Playing with parents or any adult improve children language skills as much as moral development and culture knowledge (Konca, 2019).

Children are also using technology as creators by creating digital artifact like painting and video-maker (McPake et al., 2013) or they can modify programs to solve difficulties (Fessakis et al., 2013). For example, while educational technologies in school or at home teach some targeted information, children learn how to use the devices to create in daily life and they learn more deeply about learning process and may associate educational experiences to the daily life. Moreover, technology use among children improves their educational environment. They learn how to take charge of their learning environment (Primavera, Wiederlight, and DiGiacomo, 2001). Some children may be dominant in learning environment when they are using technology.

ICT usage also benefits the children with special needs from the specialized features of technology. For example, children who could not talk is able to attempt communication with their peers through the computer or mobile devices (Donohue, 2014). Moreover, assistive technology that is specialized for the special need may help children with special needs to improve cognitive, social- emotional, physical and other developments (IDEA, 2006). If children use technology that has high quality, educational and appropriate for the personal needs, it is possible to see positive educational and behavioral results (Barr et al., 2008).

2.7.3.2 The Negative Effects of ICT Usage on Children

American Pediatric Association (APA) (2016) mentioned some physical effects of ICT usage among children. The first one is that watching television by eating food causes obesity (Wen et al., 2014) as much as the effects of food advertisements on eating habit (Paves V et al., 2015). Moreover, children may easily get weight because they are more passive while they use technological devices than traditional

ways to entertain (Karin, 2017). In addition to the obesity, increased ICT usage and exposure of television computer or mobile devices in the bedroom of children causes also sleep deprivation (Cespedes et al., 2014). Furthermore, Ekici (2016) mentioned spending long time in front of screen devices like TV, computer, mobile phones, tablets, laptops, etc may affect the eye health of children negatively.

Christakis (2008) argue each hour television viewing in a day for children is associated with harmful impact on the cognitive skills of children. They found decrease of 0.31 points in the Peabody Individual Achievement Test Reading Recognition Scale (95% confidence interval [CI], −0.61 to −0.01 points), 0.58 points in the Peabody Individual Achievement Test Reading Comprehension Scale(95% CI, −0.94 to −0.21 points) and – 0.10 in the Memory for Digit Span assessment from the Wechsler Intelligence Scales for Children (95% CI, −0.20 to 0 points). Moreover, researcher argue that there is no evidence for the benefit of early exposure to television (Zimmerman and Christakis, 2005).

Zimmerman and Christakis (2007) explored the effects of technology use towards the language development and found it has negative impact for seven-to-eighteen months old children. They also could not find any benefits of screen for one thousand children below two years old. Even parents and caregivers choose an educational TV programs or DVD videos, it was proven that viewing videos two or more hours daily of children below one year old caused a six-fold more language delay (Hayes, 2015). According to Lin et al. 2015, viewing screen rises delayed language risk by 3.3 (95% CI: 1.5–7.3) times for children exposed to television. Children who has language delay viewing screen than children with normal language development.

Studies also show the negative relationship between social/emotional development and screen time. High media use causes decreased the family-child

interaction and poorer family functioning because overuse of technological devices and parental use of mobile devices cause fewer verbal interaction and nonverbal interactions among family members as well as conflict between child and parent (APA,2016). In addition to the negative impact on social and family interaction, screen viewing affects the moral development because of the content in the screen. Spending time in front of screen may also influence the characteristics of children; overuse of screen devices may cause self-regulation problems and social emotional delay for toddlers (Radesky et al., 2014).

2.7.4 Information Communication Technology (ICT) Use among Children with Dyslexia

As a part of educational programs, technology is used to facilitate teaching and learning for whole skills of children across all age groups. According to Catchan (2013), students with special needs have the abilities to use interactive technology as well as teachers use it to adapt content depending on the children's needs or preferences. That means technology use is a technique to enhance the learning of children with special needs. As much as teaching and learning, portable technologies increase independence and leisure options of children with special needs (Stephenson and Limbrick, 2015; Kagohara et al. 2013). Thereby, new and advanced technologies for children with special needs have been produced day by day (Honan,2012).

Information and communication technology (ICT) is also a part of interventions and assessment process for CWD. Drigan and Elektra (2016) argue that ICTs such as programs and applications have a power on phonological awareness (Segers and Verhoeven, 2004) and prevent reading disabilities. Furthermore, e-reading from technological devices like iPad strengthens the reading skills as well as phonological awareness, literacy, and independent reading skills (Moody, 2010).

Computer games support the preschoolers' leadership roles and interaction when they use it an appropriate way in terms of their development (Haugland and Wright, 1997; Scoter, 2008). Van Scooter (2008) argues that computer programs reinforce children's literacy skills and mainly assist children with special needs. According to Eriksson, Musialik and Wagner (2012), cited by Drigas and Electra (2016), games help children to develop self-confidence and make them feel more powerful because they learn how to cooperate, realize their own mistakes and solve them. Madeira et al. (2015) argue that games in a specific purpose improve multisensory perception, adaptiveness and learning of CWD. Thanks to an individualized teaching and learning environment in game activities, children's memory, reasoning skill, auditory ability and their language skills may improve. The activities also develop visual perception, time and space orientation as well as motor coordination.

2.7.4.1 Visual Attention and ICT Usage of Children with Dyslexia

Individuals with dyslexia have difficulty to translate letters into sounds. Most of them cannot see letter clearly and their order because of the abnormal visual nerve cells that help to identify the letters and their orders (Stein, 2014). As the proof for the argue, many studies show individuals with dyslexia have abnormal visual evoked potentials (Pammer & Wheatley, 2001). Almost half of the CWD complain the visual problems during reading (letters move and go double) and these cause the problems to learn how to read (Stein, 2014). Visual Magnocellular system that is vital for reading is poorly developed in many CWD. This also cause slow attention shifting.

Today's technology offers different visual options for such as different background color, size and spacing during reading in an electronic device. Combination multi content forms (text, audio, images and video) improve the literacy

skill of CWD (Drigas and Dourou, 2013). Moreover, cool background colors in a screen like blue, blue-grey and green rather than peach, orange and yellow have improved the reading performance individuals with dyslexia (Rello and Bigham, 2017). The e-books today provide the opportunity to personalize the reading text. These functions made the technological devices better to read for the CWD (McCarthy and Swierenfa, 2010). Moreover, the study on effects of highlighting text on the reading ability of children with developmental dyslexia showed combining highlighting (especially blue band for whole sentences) and audio narrations is an effective method for reading in digital text (Ikeshita et al. 2018).

2.7.4.2 Using iPad for Children with Dyslexia

In addition to daily use, some technological devices may use educational technology. iPad is one of that devices that offers opportunities for CWD. According to McClanan et al. (2012), it can be used as a reading instruction in multiple ways (eBook, Educational website and educational games). Apps offered by iPad producers engage in an increased level and assist the children with increasing awareness of the text and comprehension. The study by Culén and Gasparini (2011) shows eighty-five percent student prefer to use iPad devices for reading. Touch-based interaction of iPad provides high quality experiences for children to read in addition to supporting sketch-based activities like mathematical expressions (Elazab Elshazly, 2016).

This device can be used in anywhere and anytime by children, parents and teachers thanks to the portable feature. It has a rich platform with built-in multimedia database, apps and connections to internet that are support e-readership by note-taking and annotation capabilities (Elazab Elshazly, 2016). The iPad also improves communication skills of students by using email and chatting each other in addition to rich various applications for the learning process. Moreover, it is suitable to use small

teaching group in addition to supporting the interactive and collaborative learning with portability, ease of use network capability and high-level engagement.

2.7.4.3 Assistive Technology for Children with Dyslexia

Assistive technology (AT) is any devices to assist the children with special needs. It includes a broad range of devices that assists individual differences and is more productive for the children. these devices are used to improve, maintain the functional capabilities of the children (IDEA, 2006). Not only for the cognitive ability, it is also used to achieve daily life skills, assist communication, work and even recreational activities. According to IDEA (2006), the responsibility to provide AT and plan for the children with special needs is of Individualized Education Program (IEP) team.

Assistive technology for students with dyslexia general mediates the deficit of the children such as reading, writing and spelling (Davson et al., 2018). Opportunities of AT provide children to access the information in appropriate way and to interact with the devices to improve understanding of academic skills. For example, e-readers can help for reading skills with shorter lines with more space and highlighted key points in on-screen text (Davson et al. 2018; Rello, Saggion, and Baeza-Yates, 2014). Furthermore, spell-checker, word prediction software, speech-to text programs and more may help the writing skills of CWD as they may have spelling error and slow writing problems. Berninger et al. (2015) mentioned writing instruction with iPads is effective for students with dyslexia because it improve listening, speaking, reading, and writing.

2.8 Conceptual Framework of the Study

The framework has the significant concepts of the current study. Because the main purpose of the study provides benefits and reduce the negative effects by

technology use for children, child is in the center of the conceptual framework. The developmental milestones, cognitive, physical, moral, social and emotional, are the concepts to be observed for effects of technology use.

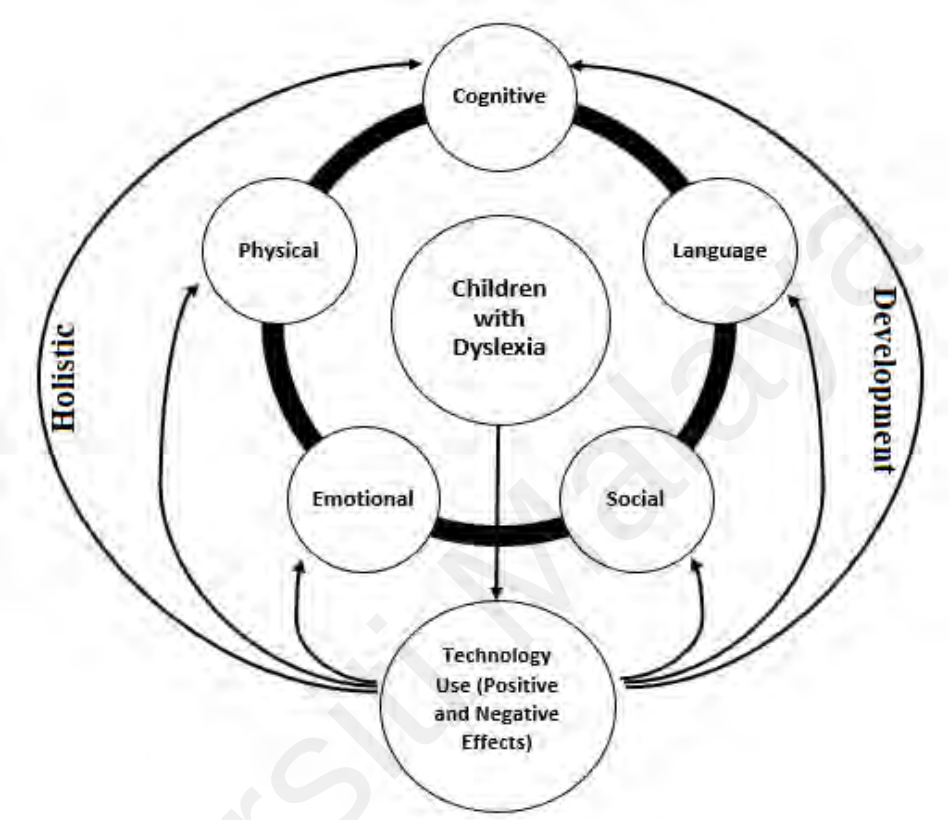

Figure 2.4. **Conceptual framework of the study**

Negative and positive effects, products of technology use, towards the development of the children are focused concept in the study. The purpose of the study is to identify them. Because seven to nine children are still dependent their parent and teacher, they are also parts of the research to collect data. Microsystem in Bronfenbrenner's Ecological System Theory is the immediate environment of the children. In that study, parents and educators cover technology use and the developmental process of children as they may control, observe or change the outcomes of technology use by children or children's exposure to technological devices.

2.9 Summary

Literature review on the current study has shown the literature gap on the technology use among children with and without dyslexia. Though same researches were conducted the effect of technology use for mainstream children, there is not any specific research on the study for CWD. However, related concepts and some researches related with technology use, early childhood development were reviewed to find out the current issue and to see the further steps for the current research.

Bronfenbrenner's Ecological System Theory on children development mentions parents and close environment of the children take an important role during development process. That is why, in the review, studies related with parents' perspective on technology use among children were reviewed. The literature review shows not only parents have positive opinion on the usage, but they have some concern on the development of their children and their attitudes. Moreover, the studies showed the overuse by parents also affect the prevalence of the usage by children.

This review also showed the definition and characteristics of dyslexia and related studies on technology use among CWD. Moreover, some ways of technology use among CWD were reviewed for the study though there is no study on the effect of technology use among children. definition of assistive technology and some sample of assistive technology was summarized to understand the main concept of the technology use among CWD as well as the early exposure of children towards the technological devices to see the reality.

Technology use by children begins in very early years with child-parent interaction in the home environment. That is why parents' view on technology use is important for the development of all children. Because these experiences learned in

the early childhood will affect the whole life experiences, technology use during the early childhood period should be balanced by the parents depending on the negativity and positivity (Aral & Keskin, 2018).

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, the methodology applied in the study is addressed as mentioned on the title of the chapter. Research design, sampling of the study, instruments, data collection techniques and data analysis of the study are introduced in addition to participants selection process, validity and reliability of the study.

3.2 Research Design

Research design helps researcher to plan and create a structure for the study and it summarizes the procedures for conducting the study. That is why the research design is very important to understand the study with strategies sampling, tools and procedures that are used in the study. In this study, qualitative research method is used as a case study.

Qualitative research is mostly suitable for small sampling and it provides a comprehensive description for a research subject, with no limitation on participant's responses and the scope of the research (Collis and Hussey, 2003). Moreover, qualitative research method helps researchers to study social and cultural phenomena like thoughts, behaviors and feelings (Babu, 2008). According to Creswell (2012), a qualitative research is a setting for a study that is explored through one or more cases within a bounded system. As this research aims to find out the effects of technology use for the development of CWD and teacher's and parent's perspectives on technology use by the children, case study setting was preferred for the study.

Yin (1994:13) defines the case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. He further defines a case study in two parts in which the first part is related with the scope of the study, and other part includes the data collection and data analysis strategies (2009:18). Therefore, it is possible to interview the participants on their opinions in addition to collect documents for needed data. That may allow researcher to have a clear vision on the issues. He also describes a case study is needed when the research question requires the circumstances to be clarified. It is beneficial to understand a particular problem and to identify cases in a depth information (Noor, 2008).

There are multiple techniques to collect data in a case study such as surveys, records interviews observations (Yin, 2009). In that study, case study design was chosen in order to gain a rich understanding on ICT usage for the development of CWD with the personal perspectives and experiences. Interviews of teachers and parents and documents on technology use of the children are sources of evidence for the current study.

3.3 Sample of the Study

According to Asiamah and Oteng-Abayie (2017), a research population may be more important for a research than can be imagined as a source of the evidence. In this study, the population determined by the researcher is seven-to-nine-year-old CWD. The population of the study was chosen from CWD in the minimum ages to get official diagnosis of dyslexia because the research aims to see the effects of early ICT usage for the development of CWD.

It is not possible to use all the population to interview for the needed data of the research, sample of the study should be determined. In order to collect the enough evidence and to make easy to access the data for the research purposes, sample of the study consists of the parents who has seven-to-nine-year-old child with dyslexia and the teachers of the children of participants parents.

The reason to choose parents and teachers to learn ICT usage for the development of CWD is that they are the real observers of the children for whole day. While parents observe children with dyslexia at home, teachers observe them at school. Moreover, parents and teachers may also see the development of the children as they care the children. All the population member was chosen depending on the sampling method and participant selection criteria.

3.4 Sampling Method

The sampling method of the study is purposive sampling method that is necessary to gather a detailed insight of the situation (Merriam, 2001). The main criterion to select the participants was voluntariness to join the interview as a part of the study and to provide needed information on the research purpose. Another criterion was the characteristics of the participants that are crucial depending on whether they are suitable for the research purposes.

Teachers and parents of CWD are two group participants of the study. Three parents were chosen by the researcher between the volunteer participants from the center, depending on the criteria which were voluntariness to provide necessary information and having seven-to-nine-year-old child with dyslexia. Moreover, three teachers were chosen depending on the child of the chosen parents. All teachers should

be teaching the child of the participant parents at least one semester and they were volunteer to be a part of the study and to participate the interview.

Table 3.1

Participant Selection Criteria

Participants	Criteria
Parents	i. Parent who is volunteer to be a participant of the study. ii. Parent who has child with phonological dyslexia between seven to nine years old. iii. Parent who has the certified diagnosis document for his/her child with phonological dyslexia. iv. Parent who show commitment in her/his child development.
Teachers	i. Teacher who is volunteer to be a participant of the study. ii. Teacher who is teaching the child of chosen parent at least one semester. iii. Teacher who had been teaching for more than one year in special education. iv. Teacher who were connected with the parents on the child development.

Teachers and parents of CWD are two group participants of the study. Three parents were chosen by the researcher between four volunteer participants from the center, depending on the criteria which were voluntariness to provide necessary information and having seven-to-nine-year-old child with dyslexia. As one of the four

volunteer parents could not know English well and preferred to be interviewed in Malaysian language, just three of them were chosen based on criteria. Moreover, three teachers were chosen depending on the child of the chosen parents. All teachers should be teaching the child of the participant parents at least one semester and they were volunteer to be a part of the study and to participate the interview.

The participant teachers should be teaching for more than one year in special education. They should have a good connection with the chosen parents on the development of the children and should be connected with the parents in the different academic and social activities of the children.

3.5 Location of the Study

The location of the study is the Kuala Lumpur in Malaysia. The teacher interviews, parent interviews and data collection process were conducted in Kuala Lumpur depending on the chosen participants whose child is a part of Persatuan Dyslexia Malaysia. The association was chosen to conduct the study as it has a wide connection with CWD and their parents.

It is important to emphasize that any researches have not conducted in classroom with student because teachers provided the documents for ICT usage of the children. These participants were randomly chosen by the researcher from the center in the Kuala Lumpur to refer the whole city.

3.6 Instruments of the Study

Three different data collection instruments were used in the current study. The techniques used are interview protocols for teachers and parents based on the research questions and document analysis about the technology use by the children.

3.6.1 Interview Protocols

Interview is one of the ways to collect the data on perceptions and interpretation of the participants of the interview for the researchers (Merriam, 2001). It also helps readers to understand the research questions with more detailed questions based on the study aims. According to Creswell (2012), interview protocol is a form stated the interview procedure, questions and space for the answers to be noted. This protocol helps the researcher to take a note and remind the questions during the interview. In addition to the audio recording, taking notes by the researcher may produce a detailed information on the perspective of the participants because interviewer may take notes on the first reaction and gestures of the participants.

The study has two types of interview protocol, the parent interview protocol (Appendix A) and the teachers interview protocol (Appendix B). Both are semi-structured interviews and based on the research questions. Having selected the sample CWD, their parents and teachers were chosen and coded based on their code. For example, Parent A and Teacher A were interviewed to collect data on ICT usage by Child A while Parent C and Teacher C were interviewed to collect information on ICT usage of Child C.

3.6.2 Document Analysis Form

According to Merriam (2001), the document summary can be collected in qualitative research to analyze the document. The document analysis form (Appendix E) consists from the name of the children and document types, date of the document preparation, summary and analysis of the sample based on research questions and literature by the researcher. The analysis focuses on what are negative and positive effects of the specific ICT usage by the children for their development. The document

analysis form helps to see ICT usage of the children as additional form to the views of teachers and parents on the development. Some example of the documents related with ICT usage are ICT based homework samples (e.g. Tablet works, internet search), daily technology use records (e.g. photos and videos taken by parents), applications using by children and families (e.g. Facebook, games, Google Play). While the document analysis form shows how and where children use ICT devices during their daily life, it helps the researcher to see quality of ICT usage by the children and which developmental areas is aimed to improve by using the devices.

3.7 Validity and Reliability of the Instruments

The results of qualitative research may not be reflected the opinions of a wider population as it is more appropriate for small samplings (Bell, 2005). The research instruments may not be generalized because theories and conclusions are based on just a small group of the population, thereby the reliability of research results being under question (Denzin and Lincoln, 2005). In order to ensure the validity and reliability of the instruments, three experts on the special education research checked the instruments of the study. All the experts have been working on special education and learning disabilities for more than 10 years at government universities in Turkey as academic staff. After review by the experts, the instruments edited by the researcher. Moreover, preliminary study was conducted to ensure the validity and reliability of the instruments.

Moreover, researcher informed the teachers and parents on the research and the aims of the interview. Also, the teachers and parents was informed about the documents needed on the technology use. Having created the procedures of instruments to collect enough data for the research questions, current documents of children's technology use were collected from parents and the teachers to ensure the

validity of the analysis as the current data shows the last and actual results of the students.

It is important to be aware of the social validity of the instruments as the research should be socially important and should target make a positive difference in a child's life. That is why whole the goals, procedures and outcomes were created under the social validity. U.S. Department of Education (2007) shows 10-15 percent of all school aged children is affected by dyslexia and 15-20 percent of the US population evidence characteristics of dyslexia according to the IDA. In addition, the Gomez' research (2004) that conducted with 2000 pupils near Kuala Lumpur shows about 7 percent of them have dyslexia.

3.8 Data Collection Techniques

Two types of interview for teachers and parents, and document analysis are data collection techniques that are used by the researcher in the current study. In addition to the interview of teachers and parents on the technology use for the development of the CWD, document analysis was done in order to triangulate the evidence gathered from the parents and teachers. That increases the validity of the study. The methods and instrument are shown in the Table 3.2.

Fraenkel et all (2016) defines the purpose of the interview is to understand the interviewers' opinion, thoughts and feelings on some specific issue. The interview also helps to find out the criteria we cannot observe but can ask to learn such as feelings, past experiences etc. (Patton, 2002). In the study, researcher used semi-structured interview to collect more information from the participants. Three parents and three teachers were interviewed in the study. Every participant arranged their own time for the interview after first meeting. Before the interview, researcher seeks the permission of the audio record for the interview and then collect some personal details on the

participants to evaluate the validity and reliability of the interview data. Each transcript of the six interviews coded based on category and child. For example, second interview was with Parent B and coded as "INT2-P-CB". The first code(INT2) referred interview 2 and second one(P) refers "Parent" while the last one(CB) referred the "Child C".

According to Patton (2002), document analysis is examining the collected data based on the research. The document analysis in the study are the children's homework based on technology, daily technology use activity photos and documents to see their technology use samples in the education environments and validate the teachers' and parents' responses. Researcher reviewed the current and useful documents.

Table 3.2
Data Collection

Method	Instrument	Data Gathered
Interview	Teachers Interview Protocol Parents Interview Protocol	Audio Record Interview Notes Interview Transcripts
Document Analysis	Data Analysis Form	Technology Based homework samples, Daily technology use records (photos, videos, reports by parents), Touch-screen Applications and Games used by child

3.9 Procedure of the Study

The procedure of the study begins with literature review on past studies and literature gap on the study. After literature review, problems and objectives were formulated and conceptual and theoretical frameworks were created depending on the past studies. Having determined research design, researcher identified and created instruments of the study and data collection techniques. For validity and reliability of the study, preliminary study was conducted, and data collection tools were developed. Having developed the instruments, sample of the study and location of the study determined. After researcher had permission to study on the center, participants of the study were chosen by the administrators of the center depending on the criteria.

Data collection procedure began with the willingness agreements of the participants and permission from the authorities and parents, and it contains gathering data through two types of techniques and data analysis.

Required permission for the study were obtained from the schools and families in order to carry out the study. Research summary, interview protocols and research procedures were submitted and presented to the school authorities, participant teachers and parents. Once the permissions were obtained, researcher began to conduct the data collection. Three types of data collection are document analysis on technology use of the children, interview protocol for parents and interview protocol for teachers on the research purpose.

During the interview with the participants, researcher explained the research summary and interview protocol to collect the aimed data for the research. For example, when participants felt tired or uncomfortable, researcher let them to take break or explain the situation they had. Moreover, researcher took some notes on the

interview protocol on the participants' reaction with mimic and gestures towards the given question in addition to the audio record. For document analysis on technology use of the children, the recent and rich documents were chosen for the researcher.

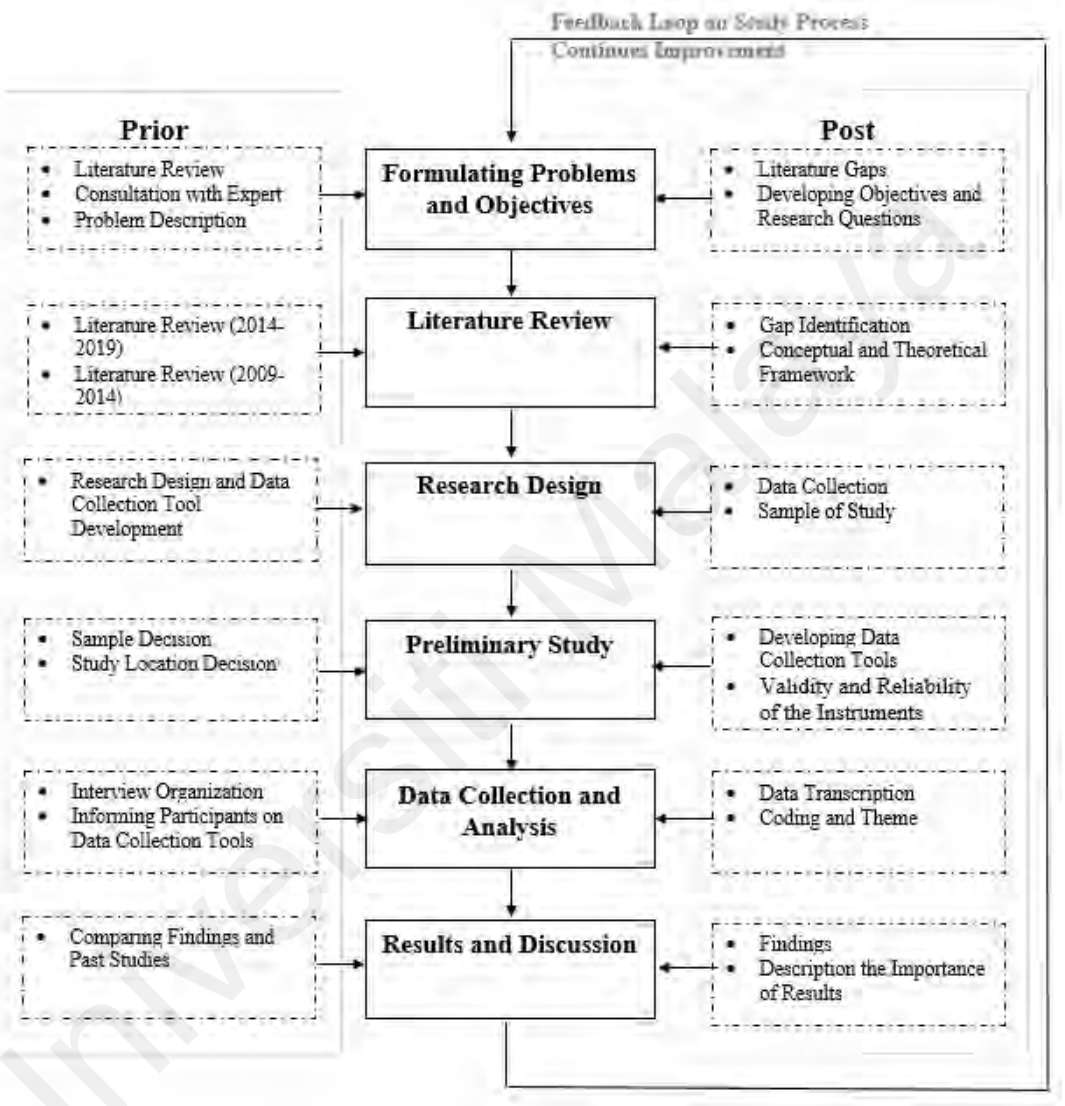

Figure 3.1. **Procedure of the Study**

3.10 Trustworthiness of the Data

Triangulation, member check, audit trail and peer reviews were used as strategies to ensure the trustworthiness of the data. Data analysis and two different types of interview with parents and teachers were used to collect sufficient data and settle the triangulation that improves the quality of collected data. Triangulation allows

researcher to collect data under different perspectives and ways, that help to see difference and similarities of the collected data for the validity.

The researcher performed member check which interview transcription was checked by the participants to confirm the accuracy. In addition, the result of the interview and data analysis were discussed with the participants in a summary. That helped the researcher to correct any misconceptions of the collected data. In addition to the member check, researcher carried out peer review that let researcher to see the study from other professional perspectives. Researcher discussed with other researchers and graduate students to control the accuracy of the result. Researcher also did an audit trail to show all the process of the study. Audit trail illustrated and explained what happened in the data collection process, procedures had done.

3.11 Preliminary Study

Preliminary study is used in qualitative studies to see how the current research will work by conducting some pre-studies. That is why a preliminary study plan was created with one teacher interview (Teacher A) in order to see the reactions of the interviewees towards the prepared questions of interview. For instance, it can be seen whether they feel clear or confused. Moreover, it was aimed to find out the time of the interview and estimate the whole study time. It shows every interview with teachers takes thirty-five to forty minutes and the questions are clear for the teachers to understand. After the preliminary study, some questions edited to get more details and clear information. For example, “Please explain was added after the question of “Why should you encourage parents to use technological devices for their children with dyslexia?” to get more details. Moreover, the question was changed into “Why should you encourage/control parents to use technological devices for their children with

dyslexia? Please explain." by adding "control" because the researcher could not know whether teacher encourage parents or control to use technological devices.

3.12 Data Analysis

Data analysis of the collected data through the interviews were done based on the deductive approach. Research questions direct to organize the collected data and analysis. For the analysis of document summary and audio records of the interviews, Atlas.ti 8 was used in order to make easy to transcribe all data and organize them.

Data analysis of the interviews was done in two stages by the researcher. The first analysis of the interview data was shortly after the interview in order not to miss some responses and reactions by the participants while the second one was done after to transcribe all the data by the interviewers. In addition to these two stages, researcher read many times the transcriptions and listened the audio records of the interviews in order to prevent misunderstanding of the responses. Moreover, the computer software helped the researcher to organize, code and add notes on the transcriptions.

Coding the collected data with sentences and some short words by researcher forms the descriptions and themes. After coding of some of the data during the analysis, grouping the codes highlights the specific information that the participants gave. In addition to the organization of the interview data depending on the research questions, the codes were regrouped based on the similarities and differentiations of the participants' responses. Then the codes were be examined again and reformed. The reformed codes were be categorized under the conceptual groupings.

3.13 Summary

In this section, research design, population of the study, sample of the study, sampling method, location of the study, instruments of the study, validity and

reliability of the study, data collection techniques, procedure of the study, ethical concern, pilot test, data analysis is shown as the methodology of the study with all details as the chapter shows whole details of the study that would be conducted after the preliminary study and all the procedures got ready.

CHAPTER 4

FINDINGS

4.1 Introduction

The chapter presents case analysis and discussion of the findings of the case study. The research questions for the study are as follows: (1) What are the positive effects of ICT usage for the holistic development of children with dyslexia? (2) What are the negative effects of ICT usage for the holistic development of children with dyslexia? (3) what are the perspectives of parents on ICT usage for the holistic development of children with dyslexia as a whole? (4) What are the perspectives of teachers on ICT usage for the holistic development of children with dyslexia as a whole?

Not only this study focused on the positive effects of ICT usage towards the holistic development of CWD, it also focused on the negative effects towards the development of the children. A summary of the data from two different types of interview and from different perspectives was drawn to illustrate the positive and negative effects of the ICT usage, the perspective of parents and teachers on the ICT usage for the holistic development of CWD as well as a summary of the data collected from the parents. The initial findings of the study showed that ICT usage by CWD has both positive and negative effects towards the holistic development of CWD.

4.2 Positive Effects of ICT Usage for the Holistic Development of Children with Dyslexia

The first research question with six sub-questions help to see what devices and applications that the children have used and the positive effects of ICT usage for cognitive, language, social, emotional, and physical development of the CWD. In

addition to the interview questions based on the research questions, the document analysis form helped to see the samples of ICT usage among the CWD (Zoom Video Classroom, YouTube, TikTok, Minecraft, WhatsApp, Playing Smart Phone and Tablet Applications, Watching TV and Movie, and Playing PlayStation).

4.2.1 Cognitive Development

ICT usage for the cognitive development of CWD has positive effects according to interviews with the parents and teachers in addition to the document analysis form. It can be seen from the findings that ICT usage helped the children easily understand while it destroyed the struggles.

4.2.1.1 Fast Understanding

Parents mentioned that children were more interested to learn through the ICT devices than classic learning methods. It triggers children to search new information through the ICT and ultimately improves their comprehension skills on new concepts as they are interested in. According to parents, technological devices with the numerous features attract children attention for the learning process as stated by Parent A;

> *"How to say ICT helps… He moves attract to that. What I see in my son, for example, if you give textbook and comic, he chooses the comic first because of the color. Color attracts him. In the same sense, if you show the TV, he will go to the TV, …. If TV and computer, computer is also first option. He wants to learn. He knows TV I can watch only, but computer I can type, I can print, I can color with PC also, everything in a computer. That sense, he likes computer very much...*
>
> (INT1-P-CA)

Combination of visual and audio in ICT devices like TV in addition to additional entertaining activities in computer helps the children to concentrate their works for a longer time during the learning process. Similarly, Teacher B responded that there were more interesting things in ICT such as playing games and watching videos which children can learn problem solving and how to do a task while they are enjoying. So, they are beneficial in a way towards the cognitive development. Furthermore, Teacher C commented that the children love things in ICT that develop their cognitive skills. She gave the examples that they can easily learn sound, shapes colors, spelling and numbers thanks to the ICT. That means the ICT supports visual perceptions of the children during learning process in addition to help understanding skills of the children with multisensory features.

The collected data also showed that children could easily learn thanks to the ICT devices and their learning process with the ICT is faster than classic methods. Parent B commented that applications like Memory Color App and educational YouTube videos in smart devices improved her child's brain cognitive and she argued that her son easily understood thanks to the ICT as much as he can catch up faster how to use gadget and understand gadgets works. In addition to Parent B, Parent A also argued computer helped her son to learn very fast as stated in the following comment;

> *"Studying in computer section, computer is very fast. He can catch up the computer very fast. Because he likes, learning also he cannot understand and repeat the questions. But, in computer sense, okay. One time you already teach okay."*
>
> (INT1-P-CA)

As computer catch children's attention easier than a textbook with numerous features and vivid screen views, children are more interested to learn through ICT and parents allow the children to use ICT for learning process. And, this interest to use ICT helps children to learn faster and easily during learning process with ICT devices as they can focus their works on ICT and eventually improve their understanding skills.

The children can learn through YouTube as it has various contents. Although Parent A did not allow her children to use ICT devices in general, she commented that she allowed to use computer because her son learned something via educational YouTube videos. She commented that when her son wonders to learn new concept, they open the computer and search on Google and watch YouTube videos about the concept (INT1-P-CA). Furthermore, Parent C said her daughter easily learn how to draw a picture and picked up new languages through YouTube videos (INT3-P-CC). She also added that she used ICT to teach her daughter spelling correctly as she made a better via WhatsApp. That application triggers her daughter to spell correctly because chatting and learning through smart phone are fun. Moreover, she can benefit from the autocorrect feature on the WhatsApp application (INT3-P-CC).

In addition to the TikTok Application, Child B played the game of Minecraft and drew some pictures via tablet. These provide children learn how to use the devices to create new items in online environment and adapt in daily life while they learn more deeply about learning process and may associate educational experiences to the daily life. The game application of Minecraft has simple and colored images, scenery building and characters that are immersive for first-person perspective and take children attention to create daily items in online platform. Other samples of ICT usage among the children are watching cartoons in TV, animated movies and YouTube videos in addition to the educational videos on YouTube. Depending on the use, they

have educational knowledge and information about daily life. Cartoons improve imagination of the children while they enjoy watching the contents. It can be seen from the parents' comments that ICT have various learning instruments and educational contents that catch children's attention for learning and improve their knowledge and academic skills.

4.2.1.2 Eliminate Struggles

Parent A said her son liked to type words on the computer and wanted to learn how to spell by typing words on computer and check whether he can type correctly or not as the programs on computer has suggestion and predictive text and autocorrect spelling. So, he did not ask everything one by one thanks to the features and feels more independent in learning process. She also added his son's dialog when he used computer to type as stated, "*... Mummy wait, I will try…I want to learn one by one. Never mind, it takes time. I will ask to learn. Never mind, I will do*" (INT1-P-CA). In addition to typing via ICT, she mentioned that the reading skills of her son improved thanks to subtitles of movies and videos he watched. Moreover, Parent C commented that they used WhatsApp to spell words to improve her daughter spelling as she liked to use ICT. She mentioned that she wanted to take an advantage from her daughter's interest on the ICT for her development as well (INT3-P-CC). Because the children are interested to use the ICT devices and the ICT provide supports (prediction words and autocorrection) for their work independently, the struggles are easily eliminated by the ICT.

Teachers also mentioned that ICT usage eliminate the struggles of the CWD. Teacher A mentioned ICT was more interactive and that kept their attention longer than a textbook or anything that they are struggling. So, their attention span is longer

when using ICT (INT4-T-CA). Moreover, Teacher A added that handwriting and coping something that are major struggles for CWD could be eliminated by the ICT as they can use the keyboard and copy-past features of the devices.

The collected data showed that Child A daily used the Zoom Video Classroom application for online classes during Movement Control Order (MCO) in Malaysia. The application provides children watching the class again and again by replaying the part that they could not understand after a live online-class. In addition to use of the Zoom Video Classroom, all three children used smart phone that provides the brain developing applications like Memory Color app that Child B used regularly as parents mentioned the applications strengthen the children's memory, auditory processes, speed processes, visual processes and attention.

4.2.2 Language Development

ICT usage among the CWD has positive effects on language development of the children according to interviews the document analysis form. It developed the language skills of the children with multifunctional usage and features. Moreover, ICT was seen as a good way to learn a new language by the participants.

4.2.2.1 Multifunctional Teaching and Learning Language

The parent interviews showed that ICT usage among CWD positively affects language development of the children. The interviews showed that ICT helped children learn language thanks to its features. Parent B stressed *"... these kids can easily understand the pronunciation and also learn the letters through visual and audio. From the gadgets, they can easily learn to speak even though sentences are not totally right"* (INT2-P-CB). Parent B was detailed her argue that her son can easily remember the dialogues and songs from the videos that he saw on TV and YouTube videos such

as ABC Phonic videos, UPIN IPIN, Ejen Ali, BoBoiBoy or movies like Batman, Spiderman and Avengers because they have rhythms to teach and favorite characters of her son. She mentioned that it is easy for her son to follow and remember the shown by his favorite characters and this help the children to express themselves better. In addition, Parent A mentioned that her son needed to see some visuals to learn other languages and ICT offers them. She also added subtitles in music videos help her son learn new songs. As mentioned by the parents, the ICT provides children visual and audio together comparing the classic methods like textbooks that have just image or text to give information. That helps the children to learn and understand the language phonologically.

ICT is good to improve language development because of its interactive features. As Teacher A and Teacher C mentioned that learning tools have images, sounds, matching and translations to teach language skills, ICT provides children better way to follow and learn new words and language. That means multiple tasks and features on the ICT help the children to understand the phonology and morphology at the same time. Furthermore, Teacher A mentioned that using ICT is easier than doing things on paper and book. He said that bringing or giving a lesson was simpler and quicker because most of these programs have electrical and difficulty levels for them. So, if you see this child is struggling, you can bring down the level or if it is too easy for them, you push up the level quite easily (INT4-T-CA). These features help children and teachers for teaching and learning process without spending more time to prepare the activities for each child's language level.

Depending on the data analysis form, the ICT usage among the children improves the language development. For example, the Zoom Video Classroom offered a chance for shy children in face-to-face communication to attend and express

themselves in online platform. They can talk to other participants and may answer the questions what teacher ask because nobody is there physically. Depending on the teacher control and organization, they can discuss and communicate each other during class and break time without shame. In addition to the app, Child A communicated with his friends through smart phone even though his grammar was not good in typing because it provided voice message and voice call for the children to communicate each other.

4.2.2.2 Able to Learn New Language

The data illustrated that ICT usage was a good way to learn new languages for the CWD. Parent C mentioned her daughter easily pick up new languages through YouTube videos. These kind of videos like ABC Phonic Songs (INT2-P-CB) provide children to see the letters, words, spelling and object that refer the words or letter while they listen to sound and easily learn the pronunciation of the letter or words. In addition, the animated characters and movies catch their attentions and keep them on. Parent C also shared an experience that they downloaded a software and used to teach her daughter Dutch language for a while (INT3-P-CC). Language software applications for kids such as Duolingo Kids have basic lessons depending on the level of children, cartoon videos, matching and other features to develop both understanding of vocabulary and grammar in addition to listening and comprehension skills. Furthermore, Parent A and Parent C commented ICT helped their children to improve spelling skills. While they are watching cartoon with subtitle or chatting via WhatsApp with autocorrection and prediction text features, they learn the correct spelling of the words.

As Malaysian population uses multiple languages (Malay Language, English, Chinese, Indian, and some local languages), parents agreed that the ICT helped the children improve second languages and learn new languages, as indicated in following comment,

> *"… Because we are training kids all the languages we have to learn. Not only Malay, but also Tamil, Chinese or English. For example, Indian movie, Bollywood, that one also we watch. Even though he cannot understand, he tries to catch up. He wants the movie."*
>
> (INT1-P-CA)

As seen from the previous comment by Parent A, the children can try to understand the foreign language by seeing nonverbal languages and gestures that are used by the characters in the movie and catch up some words thanks to the visuals. The teachers also agreed that ICT provided a chance to learn a second language for CWD as Teacher B said "… *They get to learn a bit of English language from English language games even if their mother tongue is not English… I have students who mostly speak Malay in school and at home, but they know a few words in English because they know a few words in English from games."* (INT5-T-CB).

The collected document showed that children watch TV and YouTube videos in English as a second language. Child C preferred English cartoons on TV and English YouTube channels like Hi-5 World after she had begun school and learned English as second language although she watched Malay cartoons before she had learned English as second language (INT3-P-CC). Because the cartoons and kids programs use simple languages for comprehension of the children and they have enjoyable favorite characters, the children can easily understand and develop their new and second

languages. They can also see nonverbal language in the video to understand the new words.

4.2.3 Social Development

Interviews showed that parents did not think ICT usage among CWD improved social development enough whereas they could give some positive effects of it towards the social development. Parents did not look ICT devices optimistic for their children's social development. But, during the interviews, they tried to answer the research question of positive effects of ICT usage. However, collected documents showed that ICT usage among the children had positive effects on the social development.

4.2.3.1 Confident to Communicate

Self-confidence of the CWD during communication was improved thanks to the ICT usage. As Parent A's commented that his son did not care his mistake in language to communicate with his friends. She also added that they are not only friends at school, but they are also friends at home thanks to the ICT devices (INT1-P-CA). As they feel better to communicate through the ICT, they continue to communicate and develop their friendship even they are not together. Moreover, Teacher B mentioned the TikTok App improved children's confidence and their social skills. When they get to perform videos, they also develop their social skills with a modern technology (INT5-T-CB). The applications provide children communication platforms to share their feelings with their friends without physical interaction that they can feel uncomfortable.

As the ICT usage among the children like Zoom App and Smart phone developed the language skills of the children, they can also improve the social development. It is because that virtual environment makes children more confident to

attend and express themselves during communication. This virtual communication also helps their real social relations in their future face-to-face communication. Furthermore, watching TV and movie develop the children social development. For instance, if the favorite TV characters of the children is performing well participating in social events, it is possible that they will mimic those behaviors as well, thus helping with their social development. Moreover, the videos may teach children two-way communication with other people by teaching them some communication patterns.

Documents showed that Child B played Minecraft and PlayStation that improved his social skills according to his mom because he played the PlayStation with his friends and family member and he shared his Minecraft game with his peers and cooperate to do a task. Parents also mentioned that their children feel comfortable with others when they play games in the devices.

4.2.3.2 Socializing

From the perspective of parents, ICT devices was a good way for CWD to socialize with others. Parent B clearly mentioned that "*... For now, children with dyslexia can communicate and socialize pretty good thanks to the ICT even though sometimes it takes time to achieve*." (INT2-P-CB). This is because the children try to attend all tasks and games via ICT even it is a group activity. Moreover, CWD shared their school experiences and schoolwork with each other through ICT as Parent A commented that her son always sends WhatsApp messages to his friend to learn what happened in the school and to talk about what they experienced (INT1-P-CA). She also mentioned that the voice message feature of the WhatsApp application triggers her son to contact with his friends and he likes to send fun and unmeaningful sounds to enjoy with his friends. Parent C also stated her daughter sometimes appeals her

friends for some help to do Chinese homework from WhatsApp although she is very shy in social environment (INT3-P-CC).

The interviews of teachers showed that ICT usage among CWD had positive effects on social development as the children shared the ICT when they were playing games and some apps help them communicate each other. Teacher A mentioned he used ICT for teaching in a group and children cooperated each other to do tasks under his guidance. He said, *"If it is one asking or cooperating with a friend or a group of friends to work together, then you can see that they are trying to figure out together how to solve problems."* (INT4-T-CA). He also mentioned that during the lesson, if he uses ICT materials to teach something and gives any task to perform by the children, he creates working groups to do the tasks. That means that group activities via ICT in school help children try to work together how to solve problems and develop their communication skills with peers. Teacher C also agreed that ICT helped children to communicate with parents. She mentioned she had two dyslexic children and her husband taught her children technology and they communicated each other very well (INT6-T-CC) because CWD like to use ICT devices.

The documents analysis forms showed that the children used tablets and smart phones to play games, drawing and communicate each other. Child A played tablet game with his friend and shared one tablet to watch cartoon and play games during their leisure time at home in addition to using smartphone to call and message his friends via WhatsApp application. This illustrates that the children need to interact with peers to share the devices when they enjoy through ICT. Furthermore, the devices improve children's social skills with the features of messages like email and chatting in addition to rich various applications for the learning process. ICT can be also used in small teaching group by teachers and children because of its portability, network

capability and high-level engagement. Moreover, studies showed that children learn useful information thanks to active interaction with their peers in the computer area (Björk-Willén & Aronsson, 2014; Hsin, Li and Tsai, 2014; Lim, 2012) as well as facilitating parent-child interaction. That means their social skills develop because they learn how to interact with peers and adults in order to achieve a common goal during ICT usage.

4.2.4 Emotional Development

The study showed that ICT usage among the children helped to improve their emotional development. The children used it to share their emotions and take charge for their educational and daily lives.

4.2.4.1 Sharing Platform

ICT has some positive effects on emotional development of CWD as they can share their emotions easily via ICT devices. Parent A mentioned that her son shared his emotions with his friends through WhatsApp voice messages. The application offers the children to show their emotions better than a text messages and quickly because it has emojis, sounds, images even videos to share their exact feelings. Likewise, Teacher B commented that ICT was a channel for children to share their feelings and emotions. They may share their angers in a game or excitement in a social platform like TikTok application (INT5-T-CB). While they are using them, the preference of the game may reflect their emotions and this help others to see the emotions of the children even if they do not share their emotions physically. Furthermore, you can understand the emotions of children thanks to ICT, which their posts in social media or games that they prefer as Teacher C mentioned that you could

see their emotions in their drawing, using color and understand something is wrong with the children, something wrong in the house or maybe in the school.

Teacher A mentioned that ICT could be better way to teach CWD emotion formats by images and sounds in video. He said that "*You can probably use shots, still images, and ask a child to give you what is the emotional state of being shot? … That is much easier if it's in video format because still images you can sometimes for the children easy for them to read the person's emotions format… But if you want a stronger impression, video format is better than images."* (INT4-T-CA). Because the emotions are abstract terms to teach CWD, the images, sounds and videos in ICT can clearly reflect the real emotions to understand the term for the CWD.

4.2.4.2 Happy and Enjoy

Parent A mentioned that her son was very happy to use ICT and enjoyed with ICT devices. She also stated that her son felt more comfortable when he communicated with his friends through the ICT as seen in the following comment,

> *"Today he saw his friend but at home he sends WhatsApp, "heyy I missed you lah. Where you are? Why you didn't WhatsApp me? Are you very busy?" they are talking with each other like that. Sometimes, when they are tired and bored, they send all the emojis or sometime just send some sounds "miyaww, huuu…" they enjoy like this."*
>
> (INT1-P-CA)

The collected documents also showed that the children used ICT devices to enjoy and feel comfortable during their spare time. As mentioned by Parent A, his son enjoyed watching TV, YouTube videos and playing Smartphone games. Furthermore, Child B was very happy and enjoyed while playing Play Station with his friend

watching cartoons on TV like UPIN IPIN, Ejen Ali, BoBoiBoy, movies like Batman, Spiderman and Avengers and YouTube videos. Child B also took rest by drawing pictures through his tablet in his leisure time. It can be seen that children's esteem in their peer group increases when they succeed the task of the ICT games and open the new levels of the game. Moreover, these shows that ICT helps them to motivate themselves and positively improves their emotional development.

4.2.5 Physical Development

For the physical development of CWD, ICT helps them to develop the skills according to the collected data. Not only it makes children active, it also develops the motor skills of the CWD.

4.2.5.1 Physically Active

Parents expressed that their children learned how to dance through the ICT and danced with music. Parent B commented that it was easy for her son to follow movements that were shown in YouTube video and TV and performed all the steps that had been shown via ICT such as dancing (INT2-P-CB). Similarly, Child C used YouTube videos to learn European dance and the TikTok application to create dance videos for sharing with her friends. Furthermore, Parent A mentioned that her son watching some music channels on TV and try to dance like the dancers and singers in addition to imitating military march from the videos. That clearly showed that ICT encouraged the children to be active in their daily life and thus having a healthy physical development. Teacher A mentioned that some games and special programs that involve either dance, movement or choreographs may help to improve children's physical developments even if they are expensive to access. Children can follow dance instructors, both movements along and try to do it. Furthermore, Teacher B mentioned

that some virtual reality games like Pokémon could help children to move around to get progress in the game and eventually this improves their physical development as well.

Table 4.1:

The Common Findings from the Sources about Positive Effects of ICT Usage among the Children with Dyslexia

Developmental Area	Common Findings		
Cognitive Development	Longer Attention *easy and fast learning	*Eliminates Struggles like spelling and reading	*Learn problem solving *Multifunctional learning
Language Development	*Multifunctional teaching	*Easy to use for lesson *Simple and fast	*good way for learning a second language
Social Development	*Way to communicate with peers and parents	*Develop child's confidence	*Improve social skills
Emotional Development	*Easy to teach emotions	*Make children feel happy	*Channel to share their feelings and emotions
Physical Development	*Encourage to dance	*Improve finger pressing	

As it is seen in document analysis that Child B used Zoom Online Classroom platform at home, online classes allow children to move and wear flexibly during the class. Thanks to the ICT, every child may have their classroom design depending on their body needs because there is not a regular classroom decoration. Furthermore, when they feel uncomfortable, they can pause the online class to rest their body. This flexibility during the learning prevents the physical problems of the children. Furthermore, watching sports programs and videos may generate their interest in outdoor activities as much as encouraging them to be active and healthy. Thus, the children may have physical well-being.

The parents agreed that ICT helped children's motor development as a result of being physically active. In addition to the use of piano keyboard to improve finger motor skills by Child A (INT1-P-CA), Parent C mentioned that they used to watch YouTube videos how to draw a certain picture step by step to develop her daughter drawing skill (INT3-P-CC). Teacher B mentioned that some virtual reality games (Pokémon) could help children to move around and that improves their physical development as well as the coordination and eye-hand coordination. She also mentioned ICT usage could improve their finger pressing as they generally use touch-screen devices (INT5-T-CB).

4.3 Negative Effects of ICT Usage for the Holistic Development of Children with Dyslexia

The second research question "What are the negative effects of ICT usage for the holistic development of CWD?" has six sub-questions to see the negative effects of ICT usage for cognitive, language, social, emotional, and physical development of the CWD. All these questions help to see the negative effects of ICT usage for the holistic development of CWD.

4.3.1 Cognitive Development

The collected documents and interviews with the parents and the teachers showed that ICT usage had negative effects on cognitive development of the CWD.

4.3.1.1 Distraction

The parents mentioned that ICT usage limits the learning process because children prefer to use ICT comparing the studying. Child A could not focus on other things and kept on watching same videos more time in ICT devices (INT1-P-CA) while Parent B complained ICT limited her son learning and focusing process (INT2-

P-CB). They are also mentioned that ICT easily distracted their children during the learning process. As suspected by Parent B, children do not want to do other activities and always want to play the devices and so they cannot concentrate other works when they become addictive to use ICT. Parent A commented *"... If you turn on the TV, studying behind TV first... he doesn't focus to other things, keep on watching the same thing (Cartoon Channels)... just focus on it …"*. Parent B also complained that her son easily was distracted by the ICT. It can be seen that children easily distracted by ICT usage by others. If the children see any devices around them or others use the devices, they cannot focus their work and distracted by ICT.

The participated children began to use the Zoom Video Classroom application for online classes during Movement Control Order (MCO) in Malaysia. One of the issues of the usage is that more interruptions at home cause discipline problem for children's learning because there is not a regular decoration at home. Because of the issue, mislearning and lack of academic progress occur. Moreover, Parent C mentioned her daughter watched YouTube videos such as sonic, Minecraft etc. and she commented that her daughter did not really learn anything from these kinds of videos and there was nothing positive on cognitive development in technology use of her daughter (INT3-P-CC). She also used TikTok that may not be advisable for young minds according to the studies and it is very bad way of using the phone to keep her occupied according to her mother's comment.

4.3.1.2 Usage beyond Control

Participant teachers mentioned that ICT usage among CWD affected the cognitive development because of the usage way. As Teacher A mentioned that just using mouse or keyboard negatively affects the perspective of children in prolonged

usage (INT4-T-CA), unenriched ICT usage may weaken the perspective of the children. Furthermore, Teacher C mentioned that teachers and parents should focus the interest of the children and should know the best way of learning skills of them although ICT usage is good way to teach children. As she commented that every child had their own learning way (INT6-T-CC), generalizing the ICT usage as best way of teaching and learning way for all CWD may cause the negative impact of their cognitive development.

Teacher B mentioned that unmonitored ICT usage would be negative for the children because they wouldn't know how to manage the time, or they wouldn't know they should be doing something else other than playing games. She said that parents should use ICT as reward for the children after doing a work, they should not allow them unlimited ICT usage. Teacher B also suggested that teachers should use ICT as rewards after a work of children with dyslexia because they have short attention span (INT5-T-CB).

The document analysis form showed the children watched cartoons and kids' programs on TV and YouTube videos like cartoons, dance videos and game videos that may cause negative impacts on the cognitive development. As the study showed that watching TV associated with harmful impact on the intelligence scale, memory, reading skills and classroom engagement of children (Christakis, 2008), document analysis also showed that parents concerned on child behaviors that may affect their cognitive development because TV programs, series, and YouTube videos (European dance videos, Game videos etc.) have the samples of violence and unwanted attitudes. In addition, Child B played Minecraft through mobile phone and tablet depending on the document analysis form. These kinds of games and applications have negative effects on cognitive development in mass amount of usage.

4.3.2 Language Development

The interviews and document analysis showed the ICT usage among CWD had some negative effects of children's language development.

4.3.2.1 Not Talking

Parent A mentioned that her son did not talk enough and just focused ICT devices because he spent his time by playing smart phone games and watching cartoons on TV and YouTube videos. She mentioned that *"When others call him, no listen what, he says wait...."* (INT1-P-CA). Likewise, Teacher C commented that the children dis not want to speak and communicate with real if everything was in computer (INT6-T-CC). Likewise, Teacher B also mentioned that the children were not using language as they just wanted to be in the game (Minecraft) (INT5-T-CB). As mentioned, the children spent most of their time by using ICT devices and did not prefer to talk with others. So, this causes problems in using phonology and expression while nonverbal communication with others is increasing.

4.3.2.2 Mislearning of Language

Parent A mentioned her son always used WhatsApp Voice Message to communicate with his friends and this caused low typing skills. The child chooses the easiest way to communicate by using the voice message instead of typing and eventually this causes weakness on learning the morphology of the words. Furthermore, Parent B commented that her son easily learned unwanted and bad words from game videos, and he used these words to relive himself while Parent C also complained her daughter's language chanced because she watched American YouTube programs. She mentioned her daughter started relating their languages, their uses, their use of sentence structures. The videos which the children watched shows

them not only the unwanted and bad language structures, but also it teaches the children the gestures and nonverbal expressions of the characters in the video. Because the children are highly exposed these outcomes, their language change and they begin to use body languages, gestures and these unwanted language style.

Teacher A mentioned that applications and games language could not fit all countries or areas because it had some specific colloquialisms (INT4-T-CA). That means children may learn some words or sentences from ICT (applications and games), and they may not be suitable for their own languages and cultures and it can be cause semantic change or semantic errors because they do not know the exact meaning using of the words learnt from ICT. Eventually, this may cause the negative effects on language development of CWD. Moreover, Teacher B mentioned that bullies used in the game could be dangerous for the children because they may use them even though they really do not know the meaning of them.

Document analysis showed that children are watching videos (YouTube) without any limitations and control by their parents. Thus, the uncontrolled use may cause language problems as mentioned by Parent C that applications that were used by Child C always change and cannot control what applications and games were played by her. Uncontrolled use of applications and games also causes the unwanted word use by the children because they may have negative content for child language development.

4.3.3 Social Development

ICT usage among the children had negative effects on social development of the CWD. While it makes children antisocial, it also causes some problems on social development such as bullies in social platforms and nonverbal interaction.

4.3.3.1 Antisocial

Parents mentioned that their children were very antisocial because of the technology use (smart phones, TV and tablets) as Parent B said her son had very poor eye contact, and he wanted attention as much as it's hard for him to wait, which causes he easily throws tantrum in social interaction. She mentioned that if anyone takes the phone from her son, he throws tantrum and he does not interact with him/her for a long time. This is because he always wants to play games and to watch his favorite videos (Minecraft game video, and cartoons). Furthermore, Parent C commented that she found ICT devices (in general smart phone) made her daughter very antisocial. Through ICT, they get a little bit antisocial. Parent A also said that "*Social development for me, my son doesn't talk too much. He spends the time ICT things (Cartoons on TV and games in phone). Focusing on that. When other call him, no listen what, he says wait.".* Based on parents' responses, the children did not prefer to communicate with others and prefer to soliloquies while playing game. Moreover, depending on Parent A, her son has obsession to watch same videos for a long time and this cause interaction problems to communicate with him.

All three participant parents mentioned that their children had poor family interaction because of the technology use. Parent A said "*...whatever we say, "okay okay mom later later*" … *What they do is they don't listen to other when they use ICT. They just focus on it and do same thing…(cartoons or games in smart phone)"* (INT1-P-CA). Parent A and Parent C also mentioned that children used the technology (computer and smart phone) as mask during their social interaction. Parent A stated that her son focused on computer (any cartoon videos on YouTube) and did not speak always. Parent C also mentioned her daughter use technology (TikTok app and

Minecraft Game video on Youtube in Smart phone) to isolate herself as stated in following comment:

> *"My daughter is naturally very very shy. She uses the phone when we go out places which she doesn't know the people. She tends to ask for the phone because she doesn't like to interact the people. She is fine with family member. But she is very very shy child. So, phone is like mask."*
>
> (INT3-P-CC)

As seen from the behaviors of the children, they prefer to withdraw themselves in social interaction by using ICT devices. When they feel uncomfortable in any social environment, they focus to use ICT to isolate themselves instead of interaction with others. Eventually, this behavior negatively affects their social development.

The children used Zoom Online Classroom during the MCO to continue their school in online platform. However, the application may cause negative social development for some children. While they use the alternative classroom, they could not communicate with their peers and played in the garden as seen in document analysis form. Furthermore, it may cause future social problems because there is no specific school authority in the online classroom.

4.3.3.2 Self Usage

Teacher A and Teacher B mentioned that ICT usage on their own for prolonged periods of time can cause the negative effects on social development. Teacher A advised that *"It should be either done in groups or short spans of time so that they at least have the time used in social, social activities and not most of the time sitting on their own and just doing everything by themselves. If it is not used in the correct way, then yes, it can have a negative effect, but if you monitor their usage and the amounts*

of time, they use that they are on using these technologies, then, it should be okay to use." (INT4-T-CA). Teacher C also emphasized the bullies in social platforms although she mentioned CWD do not use more social media and computer where bullies are in. She also mentioned the children do not do activities because of the ICT (smart phones and computers) use and uncontrolled time of ICT usage. She said that children do not communicate with parents because they just want to be in ICT (game applications and YouTube videos) (INT6-T-CC). As mentioned by the participants, children use ICT devices by themselves and alone for prolonged period. This causes developed intrapersonal character and weak interpersonal interaction of the CWD.

As the teachers suggested to control ICT usage for the social development of the children, Parent C mentioned it took time a while her daughter to calm down and get back into after over two hours technology use (Smart Phone) at home. So, she said she tried to control her daughter's technology use to deal with her antisocial behaviors at home. Furthermore, document analysis form showed that the children excessively used smart phone (any games and cartoons on YouTube), tablets (any games and cartoons on YouTube), TV for cartoon channels and PlayStation in daily life. That caused decreased the family-child interaction, family functioning and peer interaction as it impacts fewer verbal interaction and nonverbal interactions among family members as well as conflict between child and parent (APA,2016). Furthermore, watching television may present later specific risks of inadequate social skills as well as antisocial symptoms because of uncontrolled and unlimited use.

4.3.4 Emotional Development

The collected documents showed that parents concerned on emotional development of the children because ICT usage affected their emotions after using

long time. Furthermore, the teachers suggested to control the contents of ICT usage as they have negative impacts on the children development.

4.3.4.1 Emotional Problems

Parents mentioned that their children had negative emotions after technology use for a long time. Parent B mentioned that her son throwed easily his tantrum and cried if others did not give smart phone and did not what he wanted. Furthermore, Parent C commented that she found if her daughter spends more than two hours in front of the phone, she hurts more attitude things. She also said her daughter immersed herself in the YouTube and if you take the phone away from her, she stays a little bit glazed for a while, it takes time to calm down and get back into for her. While the smart phones cause children have introvert characters, they also cause children throw tantrum as the children ask to use the devices and prefer to withdraw themselves from others.

Teacher C also mentioned that **"***... You can never see how the children' emotions can be if you only put them in one corner with this computer. The kids will not tell you what happened today ...because... you only put them in that kind of situation that is lonely for me."* (INT6-T-CC). Moreover, Teacher B mentioned that if they don't know how to tell their parents or tell the teachers about their problems like someone does comment something nasty, it can have negative impact on their emotional development (INT5-T-CB). As the children need social interaction to progress their emotional development, the overuse of self ICT usage and less social interact with parents causes undeveloped emotional skills and eventually cause emotional problems like throwing tantrum.

Parents complained that their children learned bad and unwanted behaviors through the TV programs and YouTube programs as well as violent games. Parent A said her son tent to fight after watching fighting on TV and he asked her mom whether smoking is good or not because TV series and movies have the characters who are smoking. In addition, Parent C complained her daughter learned some American dances and behaviors through YouTube videos and her family did not like these kinds of attitudes. She also added that her daughter got a bit moon because she emulates what she saw on YouTube. Inacceptable behaviors learnt by the children through ICT cause emotional problems as well because the children should adapt the society as well as self-awareness and regulations skills for a emotional development.

Teacher A mentioned that for the emotional development of CWD, ICT (Internet based uses) use should be monitored and supervised. Otherwise, it does have dangers them (INT4-T-CA). Likewise, Teacher B said that they can feel angry if they play violent games too much. She mentioned that the children need to interact with people to know how to manage their emotions. Otherwise, they do not know how to speak up or how to talk about the emotions and how to manage it. She also commented that maybe they would just feel angry on their own and not talking about it (INT5-T-CB). While children are exposed bad content of ICT like violent and bullies without any observations, they need to share to relieve themselves in order not to feel negative emotions such as anger, disgust, sadness and contempt. That is why the teachers suggested to monitored and supervised ICT usage.

Zoom Online Classroom may also cause some emotional problem for children. Children who is not attending class actively may be more silent and teacher can skip them because it is difficult to control all students in online classroom. Furthermore, learners may have anxiety or self-efficacy issues toward the Internet and computer use

according to Robinson and Doverspike (2006). In addition, overuse of screen devices (TV, computer, tablet, smart phone) may cause self-regulation problems and social emotional delay for toddlers (Radesky et al., 2014). For example, cyberbullying in TikTok and Internet use is on the rise, which may put children into unpleasant situations as a victim. Moreover, there are still huge number of TikTok videos like self-harm that can scar the psyche of a child and can cause the feeling of fear as much as anxious.

4.3.5 Physical Development

The collected documents illustrated that children did not move enough when they used ICT devices. In addition, it was possible that they had some physical problems as their leisure time last by only using ICT instead of outdoor activities.

4.3.5.1 Limited movement

The interviews showed that parents concerned their children's physical development because they did not move enough when they used ICT like computer, TV and smart phones. Child A did not move anywhere when he used smart phones and watched cartoon on TV even if he needed to go to toilet. Thus, her mom thought that this would cause some physical problems in future. Furthermore, Parent B stated that her son has limited movement and ICT lets off motor sensory of her son because he did not expose the nature to play. She mentioned that her son is addictive to use playing games via smart phones, tablets computer and PlayStation and watching Cartoons and movies and YouTube kid videos. And these ICT usages did not let him to move and interact with nature. Parent C also commented that children in this generation was not stronger enough even to climb structures in playground because of

the ICT usage and limited movement. They prefer to use any ICT devices instead of doing activities and being active.

Teacher A emphasized the way of ICT usage should be encourage the physical activities of CWD otherwise it has negative effects on physical abilities as mentioned in following comment:

> ***"****If the children are only using this or any sitting down during the day, using handheld devices for prolong periods of time that can again have a negative effect on physical abilities. There should always be time for physical activities…"*
>
> (INT4-T-CA)

Most of the ICT devices like TV, computer and applications on smartphone are based on tiny movements. The portable feature of smart phones and tablets also do not help children to have physical activities because the most of applications causes children to sit and play for a long time. It just help to access the devices in every place and this causes limited movement

4.3.5.2 Physical Problems

Parents also concerned about some specific physical development like finger, hand and eye development because the children use always screen and handheld devices like smart phone, tablet, computer, TV and PlayStation. Parent A mentioned their hands and eyes may medically get some problems if they always use smart phones and would get back pain problems and so on as they do not move their body for a long time. Moreover, Parent C commented that she suspected some children had problem in finger black and hand problems because they are using handheld and touch-screen devices for a long time while Parent A thought brain also may get some problems

physically after prolong time use. Likewise, Teacher B exemplified a student who was quite chubby because he liked to play game in computer and smartphone, and he did not like to go outdoors to mention the negative effects of ICT usage (INT5-T-CB). In addition, Teacher C mentioned that if they use ICT (smart phone and TV) without having movements, they lost the motor skills. She also added that only hands are moving, but the whole body is not when the children use smart phone (INT6-T-CC).

Table 4.2:

The Common Findings from the Sources about Negative Effects of ICT Usage among the Children with Dyslexia

Developmental Area	**Common Findings**		
Cognitive Development	*Limit learning process	*Easy to distract	*Focus problem
Language Development	*Unwanted and bad words	*not fit for all language	*does not talk enough
Social Development	*Antisocial	*Less communication with others	*Poor family interaction
Emotional Development	*Easily throw tantrum	*Bad and unwanted behaviors	
Physical Development	*Less movement	*Issue on motor skills	*Negative finger, hand and eye development

In addition, all students could not have appropriate class materials such as appropriate size screen, desk and table for online classroom as it can be seen in document analysis form of Child B. Though he had suitable table and chair for online class, he watched the class through a mobile phone screen that may cause eye-deficit after long term uses. In addition to the online classroom, the participated children used ICT devices like PlayStation, TV, computer, mobile phones, tablets and laptops, which negatively affect the eye health of children for long time spending in front of the screen

(Ekici,2016). Document analysis forms also showed that children were spending their time with ICT (smart phone, TV, computer, tablets and PlayStation) by only sitting in front of the devices instead of outside activities, which causes physical problems. As watching TV decreases in time spent doing weekend physical in addition to decrease involving physical effort in activities (Pagani et al,2010), it may cause future physical deficits for the children.

4.4 Perspective of Parents on ICT Usage for the Holistic Development of Children with Dyslexia

Interview also focusing on the parents' perspective of ICT usage among CWD for the holistic development. Three sub-questions help to understand the perspective of parents on ICT usage of children with dyslexia for the holistic development. Moreover, other responses of parents on ICT usage among the children during the interview will help to see their perspectives in addition to parents' opinion part of the document analysis form.

4.4.1 Early Exposure

Parent A mentioned that they had rules to use technological devices such as TV, phone and computer in their home because they had also negative perspective on ICT usage as well as positive ones. As an effect of this rule, Child A prefers to play with friends outside and at school instead of playing game on phone if he has friend around to play. According to Parent A, her son leaves devices with his mom and explores environment and ask all details her mom what are new and different to him when he is outside. She also commented that nowadays parents gave the ICT devices to even babies who already know how to sit whereas it was not allowed to use devices during the early age in their home as they saw the negative effects of ICT usage. She

thought that after two years old when children's IQ was already developing and they began to talk, learn and understand the devices, it could be allowed children to use ICT. She said that around two years old, parents could let children use some learning apps and watch cartoons. Furthermore, she added that for CWD, ICT usage should be allowed after school age because theoretical part was difficult for them.

Parent B allowed her son watching YouTube videos to make her job easy, playing Minecraft to entertain him and playing apps like Memory Color App to make him learned from the gadget, and using smart phones to keep up with the technology since he was two years old. Moreover, Parent B added that she felt like disappointed to give gadgets her son very early age as kids from four to at least six or seven years old should be exposed to the outdoor activities rather that playing gadgets. According to Parent B, his son is addictive to use ICT devices and it is really hard to keep his son away from the smartphone, cartoons and PlayStation. Moreover, she mentioned that her son has negative emotional and social development because of the overuse of ICT devices.

Parent C mentioned that her daughter was exposed to her own videos and other videos when she was around six-month old. Furthermore, she mentioned that it was normal parenting that put the child in front of the TV for her to some entertainment when you get her dinner ready, while you are preparing work etc. to fill her times. She also added that watching kid videos from YouTube and Kids programs on TV filled her all times when she was younger, and still, she even eats in front of TV. This early exposure to ICT devices caused her daughter to be addictive to use ICT devices and it is difficult to control her ICT usage as she is already addictive according to her mom. Parent C also mentioned that she felt she had to give ICT her daughter because it was

peer pressure that children need to know what goes on out there as she explained in the following response;

> *"They need to know who the latest artist and the phone gives them to access to that. So, they don't feel left out all their friend's I haven't that conversation. Even though I would like her to live without phone, I don't want her to go to school and having to manage peer pressure what they all know who latest faces, and all know who Justen Bibber is and she doesn't. … To make sure you know, she can keep up with the times. This is not a point bigger. … But you know, they still have to go to school, they have to handle this pressure. So, I still give my phone."*
>
> (INT3-P-CC)

Because she thought there was peer pressure on her daughter to know daily news and information, she cannot limit her ICT usage and she is still technology addictive even though Parent C does not have any positive perspective on ICT usage by her daughter and she cannot see any important effects of the usage.

4.4.2 Timing to Control

Parent A commented that parents should control the ICT usage among CWD. She said timing is the main factor to control her child with dyslexia to use technological devices as mentioned in the following answer: *"I didn't say "one day hundred percent you cannot use the phone. NO.". one day, "Okay ten minutes, watch. Now six, eight you have to turn back. My son doesn't use computers daily. One or twice a week maybe. But television is daily… 7:30 to 8:00. Half an hour …"* (INT1-P-CA). As an effect of timing to control ICT usage of her son, Child A are not addictive to use ICT

devices according to her mom while other two participant children are excessively addictive.

Parent B stated that parents should control the ICT usage among CWD because she thought it has more negative effects than positive effects for the development of children. The factor to control her child to use ICT is balancing between gadgets and indoor-and-outdoor activities by limiting the ICT usage and focusing on physical and sensory activities (INT2-P-CB). She also mentioned balancing ICT usage and activities was pretty hard because she was active user of ICT and she was addictive to use online ICT for searching information from Google, recipe, videos, Facebook, Instagram and viral news. Furthermore, she mentioned that her son shows some negative outcomes like throwing tantrum and being aggressive while they are trying to control his ICT usage as he was excessively exposed to use ICT from the childhood and he is still addictive to ICT usage. She highlighted that gadgets were good, but it should be used moderately, and gadgets also should be used accordingly like specially to help to assist in the development of the education rather than the entertainment. In addition, document analysis form showed that still Child A daily uses ICT devices to entertain while his parents try to use some educational applications like Color Memory Game that catches her son child attention while developing his memory skill and cognitive development.

Parent C mentioned that her daughter was addictive to use ICT. That is why she thought that parents just need to control ICT usage by their children. Parent C highlighted the fact that it is very hard to control very hard to take devices from them after they become addictive. She mentioned main issue in the following comment;

"They struggle transition in from watching TV where the colors move is very fast. What I also find, I think part of the reason why she doesn't have so

much focus is they are so used to addicting the technology where things move really really fast. You don't have to follow through anything from there. You don't like the YouTube, change it. You just can find another series another cartoons. There is always a different content. You don't have to sit through a single thing. So, you never have to accomplish anything."

(INT3-P-CC)

These features of ICT caused being addictive to use it and the children cannot adapt the real world because they spend most of their time in front of the screen. In addition, as mentioned by Parent C, the children can change what they do not like in YouTube while it is hard to do in real life. That is why they prefer to use ICT instead of other activities and communication with friends.

Parent C also mentioned that she allowed her daughter to use ICT for a specific time. Before the time finished, she warned her daughter "Last ten minutes, five minutes…". Otherwise, she has emotional problems when her mom takes the phone away. She also said that she is working at her daughter's guilt by giving her some extra ICT usage. That means that she can recognize the phone is not her right and she does not have right to access the phone without her mom permission. That was privilege her mom gave her for which she has behaved. According to her mom, this method helps her daughter understand her mom limits her ICT usage for her goodness.

4.5 Perspective of Teachers on ICT Usage for the Holistic Development of Children with Dyslexia

The research is also focusing on the teachers' perspective of ICT usage among CWD for the holistic development. Three sub-questions help to understand the details on perspective of teachers on ICT usage of CWD for the holistic development.

Moreover, other responses of teachers on ICT usage among the children during the interview will help to see their perspectives on ICT usage for the holistic development of CWD.

4.5.1 Age of ICT Usage

Teacher A argued that CWD should be allowed to use ICT from 6 years, from the first year of school where you use technology to bring in that part. It is because for dyslexic students it is important to learn sounds and contraband and connect the sounds with images that ICT provides all them together. He suggested to start off with basics programs that have just the sounds of a different animal, the sounds of things that we have around us now environment as a date because that is what teachers try to do when they teach reading, the letters of sounds are trying to make that connection.

Teacher B thought that children should be allowed to use ICT after ten years old, even twelve years old when they are teenager because they can know what the positive and negative impact could be. She also added that they would have to know how to use ICT especially if they want to have a social media account.

Teacher C replied that children with dyslexia may be allowed to use ICT when they are six to seven years old although she said she did not allow her children to use ICT and tried to do activities at home instead of watching TV or using any ICT because more activities mean more fun and more development. Furthermore, she added that television can be allowed CWD for an hour, but television should not be "just sit down and watch". Teacher C also commented why she said six to seven years, they can use ICT is that there is a lot of these sound, the ABC song to listen that they can understand already when they are six to seven years old. It can be seen from comments that the

participant teachers do not prefer to use ICT during early childhood for their students' development.

4.5.2 Control

Teacher A mentioned daily ICT usage of children should be controlled for the content and aimed to improve his knowledge of the world's knowledge. Teacher A encouraged parents to use technological devices for their children with dyslexia because it made them more knowledgeable or even help them in improving their reading and writing skills if parents can bring them content that inform them. He also mentioned that it should again be controlled into the amount of time they use it for and what content is provided as they will not make the right decisions and they do not have the knowledge about to make the decisions by themselves.

Teacher B commented that parents definitely should control the children for their ICT usage because most CWD, they don't really have good time management. She said "*They would just play games all the time if parents don't control them. And then, they can be very addictive to them. It would not help for their learning for example. They should definitely monitor the use of.".* She also added that it can be very helpful if parents can show the children videos or games, simple games that children can play before school age, but it shouldn't be, of course, overuse of technology.

Teacher C commented that it is better to control ICT usage of CWD by the parents because social media or computer that are not just for children to learn thing and their physical, emotional development can never get from there. She mentioned that parents should be tough if they want their children to read and learn something. She added for her thought that being tough does not mean you don't love your children while it means you want them to learn. Teacher C argued that if parents let the children

sit one whole day in front of the TV, they do not do anything else and watch TV for all days as mentioned in the following comment:

> *"You see, their whole body is like suit to sit. OK. You sit down there forever. Sometimes, I do that. "Mummy, I want to sit down." "Okay, sit down.". You don't eat, you don't go to toilet, you don't go to shower. "No, mommy, I'm going to off now."*
>
> (INT6-T-CC)

4.5.3 Pros and Cons

Teacher A mentioned that one of the pros of ICT usage among the CWD is attention span. He also mentioned it provides them the entertainment way of learning as following comment;

> *"For them to read this already is a struggle and difficulty. If you can bring in a method that makes a more fun, maybe they open in learning. ... They want to achieve, they want to learn, and it is the part of mental attitude that they find to achieve in classroom."*
>
> (INT4-T-CA)

Teacher A also argued that there is not enough software that I've come across because they aren't specifically for if it's a Malay student, a second language student for English. He also suggested that do not put all your hopes in technology because there are some differences between children for learning and perceiving information and it is based on child to child's situation (INT4-T-CA).

Teacher B mentioned that ICT usage among CWD has pros if the parents know what kind of application apps to use to download. She said that there are a lot of online resources that are helpful for CWD in learning like some apps that can help them with

reading, reading phonics, some games for them to play, and watching some interesting videos for learning. Moreover, she added that some songs can teach from phonics, mathematics to be very helpful for their learning. On the other side, Teacher B commented that if we just leave them with ICT like a mobile phone and all that on their own to the children, they would choose games, for example, shooting games that everyone's playing. Then it would not be helpful. Consequently, she highlighted that the correct use of ICT is important to be helpful for the development of CWD. Moreover, Teacher C mentioned that in her opinion ICT usage has more cons that pros because social media like Facebook and YouTube does not have anything useful whereas children can face unwanted things on them.

4.6 Summary

In the chapter, the findings on the positive and negative effects of ICT usage towards the development of CWD were discussed depending on the interviews with parent and teachers in addition to perspectives of the parents and teachers on ICT usage among the children. In addition to the interviews, samples of daily ICT usage of children were collected with the cooperation of the parents and analyzed depending on the parents' views and literature review on the sample uses.

The analysis of the sources began with positive effects on the holistic development of the children by dividing demographically the sub-developmental areas (cognitive, language, social, emotional and physical development) and then the negative effects of use in different sections of sources and finally analysis of the perspective of parents and teachers depending on the research questions.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter contains the interpretation of the results. The findings of the research compared with the literature review. The purpose of this chapter is to discuss the findings and the outcomes of the research in relation to the results that have been obtained. Moreover, in the chapter, the findings were summarized, and their implications discussed. This chapter includes the suggestions for further research on ICT usage and its effects on holistic development of CWD.

This qualitative case study explored the information and communication technology use for the holistic development of CWD. The study focused on what are positive and negative effects of ICT usage for the holistic development of CWD, and how are parents' and teachers' perspectives on the ICT usage among the children. This chapter discusses the previous researches on ICT usage among the children, the effects of ICT usage towards the development of the children and findings of the current study.

5.2 Summary of the Findings

The main purpose of the study was to explore the effects of ICT usage towards the development of CWD. The study also explored the parents and teachers' perspective on the ICT usage among the children as they played a main role in the ICT usage among the children. In the light of the overall findings of the study, ICT usage among the children had both positive and negative effects on their development.

The findings illustrated that ICT usage among the CWD had positive effects on cognitive development of the children such as longer attention, fast learning

through multifunctional teaching and learning techniques, eliminated struggles like spelling and reading and improved problem solving skills. Moreover, multifunctional teaching methods through ICT made lessons easy to teach the language and ICT was good way for learning a second language for the CWD. Furthermore, applications like TikTok and WhatsApp were good ways to improve the children's social skills, communication with peers and parents and they developed their confidence to be more social in their social lives. ICT also helps teachers teach emotions to the CWD while they felt happy and enjoyed during the ICT usage. In addition, the ICT were used by the children as a channel to share their feelings and emotions with peers and parents in thein social environment. The ICT usage encouraged the children to be active like the dancing with YouTube video and following the choreographies from the applications while it also improved the finger pressing.

The study showed that the ICT usage among the children limited their learning process, focusing skills and caused unwanted and bad words use among the children. The ICT usage also negatively affected the language skills of the children such as less talking, mis-language development. Moreover, ICT usage caused that the children were antisocial and had poor family interaction and less communication with others in a social environment in addition to the emotional problems like easily throwing the tantrum and bad and unwanted behaviors. Furthermore, the ICT usage caused the physical problems such as less movement and motor deficits in finger, hand, eyes and gross motor.

The study showed that the parents of CWD allowed their children to use ICT during the early childhood. Although one of the parents had rules to use ICT at home, others allowed their children to use ICT after six month and 2 years old in order to entertain, make child learned from the gadget, keep up with the technology and to fill

time of the baby during preparing some food. In addition, the parents suggested to control ICT usage among the CWD because the ICT had negative effects on their development and the children should be exposed to the outdoor activities rather that playing gadgets before school age. All the parents agreed that timing and balancing ICT usage and indoor-and-outdoor activities were the factors to control their children's ICT usage. The findings revealed that the parents were aware of the benefits of the ICT usage, but they emphasized it should be used accordingly to help to assist in the development of the education rather than the entertainment.

The findings of the study illustrated that Teachers suggested to use ICT among the CWD after school age because ICT usage helps the children learn sounds and letters with images that ICT provides, and they can understand learning applications after school age. In addition, they mentioned parents should control ICT usage among the children to improve their knowledge because they do not have time management, ability to choose beneficial content whereas they encouraged parents to use technological devices for their CWD because it makes them more knowledgeable or even help them in improving their reading and writing skills if parents can bring them content that inform them. Furthermore, the teachers mentioned that the ICT usage had both pros like longer attention span and cons like overusing and adverse contents depending on the usage way and contents of ICT.

5.3 Discussion of the Study

Researchers explored the different studies on ICT usage and its effects on children development although there are not enough researches on ICT usage for development of the CWD. Some of the studies (Madeira et al., 2015; Hsin, Li and Tsai, 2014; Drigas and Dourou, 2013; Fessakis et al., 2013) showed that ICT usage among

the children had positive effects on the children' development while some of researches (Kantarci, 2018; Pew Research Center Data, 2018; Radesky et al., 2014; Laurillard, 2012; Christakis, 2008; Zimmerman and Christakis, 2007) showed the negative impacts of ICT usage towards the development of children. It is the fact that most of the children with and without dyslexia use ICT devices during early childhood and primary school even though there are not certain results on ICT usage and its effects. That is why the literature needs studies on ICT usage for the development of CWD.

The study investigated the effects of the ICT usage towards the development of the CWD in primary Malaysian children although generalizations from single case study are limited. The findings of the study supported that some effects of ICT usage towards the holistic development of CWD are same with the effects of ICT usage towards the children without dyslexia depending on the previous studies.

5.3.1 Positive Effects of the ICT Usage for the Holistic Development of the Children with Dyslexia

The study illustrated that ICT usage among the CWD improved their cognitive developments. The findings of the research showed that ICT provides the children longer attention, easy and fast learning, problem solving skills while it eliminates the struggles like spelling and reading with multifunctional teaching and learning ways. Depending on the literature, almost half of the CWD has the visual attention problems for reading (letters move and go double) and these cause the problems to learn how to read (Stein, 2014), and slow attention shifting. The finding of Drigas and Dourou (2013) supports the current research findings that combination multi content forms (text, audio, images and video) improve visual attention and consequently the literacy

skill of CWD. Moreover, games in a specific purpose improve multisensory perception, adaptiveness and learning skills of CWD (Madeira et al., 2015) in addition that children can modify programs to solve difficulties (Fessakis et al., 2013).

This study found that ICT usage improved the children's language skills with the efficient features. The sources showed that the children easily understand the pronunciation and also learn the letters through visual and audio as supported by the study of Ikeshita et al. (2018)that combining highlighting (especially blue band for whole sentences) text on the reading ability of CWD and audio narrations is an effective method for reading in digital text. Moreover, in the study, the teachers mentioned that learning tools have images, sounds, matching and translations to teach language skills, and teaching with ICT is easier way for the teachers while ICT usage is better way to follow and learn new words and language for the children because they need to see some visuals to learn new words. For instance, iPad can be used as a reading instruction in multiple ways such as spell-checker, word prediction software, speech-to text programs, eBook, educational website and educational games (McClanan et al., 2012). Furthermore, the study showed that the teacher use ICT to eliminate the struggles by bringing down the level or pushing up the level quite easily depending on each child's level. Catchan (2013) supported the finding that teachers use ICT to adapt content depending on the children's needs or preferences. In addition, Drigan and Elektra (2016) argue that ICTs such as programs and applications have a power on phonological awareness and prevent reading disabilities in addition that e-reading strengthens the reading skills as well as phonological awareness, literacy, and independent reading skills (Moody, 2010). In addition, the study found that ICT usage is good way to learn new languages and to improve the second language for the children through YouTube videos or subtitles in music videos as mentioned by Van

Scooter (2008) that computer programs reinforce children's literacy skills and mainly assist children with special needs.

The study found that ICT usage had effects to develop the social development of the CWD. It was shown that the social skills of the children improved thanks to the multiplayer games and the social media programs like TikTok and WhatsApp. The Children used the ICT as a way communicate with peers and parents. The study of Hsin, Li and Tsai on technology use of young children without dyslexia (2014) supported the findings that technology use among the children improves their collaboration and interactions with peers while they are playing multiple player video games. They found that the games encourage children to communicate in order to complete the task. Moreover, the current study found that ICT improved the children's confidence in social environment as supported by a study on ICT usage among the children with special needs that children who could not talk is able to attempt communication with their peers through the computer or mobile devices with the specialized features (Donohue, 2014).

In this study, it was found that ICT usage among the children made children feel better and happy. Likewise, Drigas and Electra (2016) also mentioned that games help children to develop self-confidence and make them feel more powerful because they learn how to cooperate, realize their own mistakes and solve them (Eriksson, Musialik and Wagner, 2012). This is not only for the daily life but also for learning environment because children learn from the ICT how to take charge of their learning environment (Primavera, Wiederlight, and DiGiacomo, 2001). This causes children may be dominant in learning environment when they are using technology. Furthermore, in the current study, it was found that teachers found to use ICT easy to teach the children emotions with visual and audio Likewise, Barr et al. (2008)

mentioned it is possible to see positive educational and behavioral results If children use technology that has high quality, educational and appropriate for the personal needs. The findings of the study also showed that the children use ICT as a channel to share their feelings and emotions as supported by the study that playing with parents or any adult improve children language skills as much as moral development and culture knowledge (Konca, 2019) because they share their emotions and daily knowledge each other.

Depending on the findings of the study, the ICT usage helped the physical development of the CWD. The study showed that it was easy for the children to follow movements step by step through the YouTube videos and TV programs. They learnt how to dance or imitate military march from the programs. Moreover, some virtual reality games or programs that involve dance, movement or choreographs helped to improve children's physical developments. In addition that watching sports programs and videos generate children's interest in outdoor activities as much as encouraging them to be active and healthy, portable technologies increase independence and leisure options of children with special needs (Stephenson and Limbrick, 2015; Kagohara et al. 2013). Furthermore, the current study found that the finger motor skills and eye-hand coordination of the CWD improved thanks to the piano keyboards and some educational drawing videos in the ICT that the children used as supported by the previous studies that assistive device is used to replace or circumvent an ability damaged or absent. Not only for the cognitive ability, it is also used to achieve daily life skills, assist communication, work and even recreational activities. Korkmaz and Usta (2010) suggested that technology use among the children or teachers use for educational aims should ensure an active and student-centered education in terms of their development. As it can be seen that efficient ICT usage supports the children to

improve development and eliminate the deficits, *a*ssistive technology for the children with special need help them to improve cognitive, social- emotional, physical and other developments according to *IDEA (2006)*.

5.3.2 Negative Effects of the ICT Usage for the Development of the Children with Dyslexia

The study demonstrated that the ICT usage among the CWD has negative effects on their cognitive development. The study found that the ICT usage limits learning process of the children as supported by the study of Christakis (2008), which is ICT usage decrease the reading score, reading comprehension scale, and memory span of the children. Depending on the research, people use ICT in order to entertainment, streaming video, checking email, online shopping, e-reading, listening, watching, sharing, chatting, playing video-game and so on. (Pew Research Center Data, 2018). That cause children easily distract form the devices because they have so many usages apart from educational usage. The finding of the current study also supports that the CWD distracted by ICT while studying. In addition to the distraction by the ICT, the children had also focus problem apart from ICT devices as supported by the Christakis (2008) that each hour television viewing in a day for children is associated with harmful impact on the cognitive skills of children.

The ICT usage among the CWD caused some problems on language development. The children did not talk enough depending on the parents' observation as supported by APA (2016) that overuse of technological devices and parental use of mobile devices cause fewer verbal interaction. Zimmerman and Christakis (2007) also found that there are negative effects of early technology use towards the language development of the children. Moreover, watching screen devices increases delayed language risk by 3.3 (95% CI: 1.5–7.3) times for children exposed to television (Lin

et al., 2015). In the current study, it was found that ICT does not fit for all languages and causes problems on the children languages. That can be explained by the findings of Laurillard (2012) that technology is important drivers for education though most of technological devices are not developed for the educational purposes. That means the children use devices and learn even though they are not suitable for their original languages.

Regarding the findings on social development of the children, the children who used ICT showed antisocial symptoms, less communication with others and poor family interaction. Similarly, APA (2016) shows that high media use decreased the family-child interaction and poorer family functioning. In addition, overuse of technological devices causes fewer verbal interaction and nonverbal interactions among family members as well as conflict between child and parent (APA,2016).

Radesky et al. (2014) mentioned overuse of screen devices causes self-regulation problems and social emotional delay for toddlers and spending time by using ICT influence the characteristics of the children. Kantarci (2018) also argues that children may totally adapt the virtual environment if their parents are also under the effects of technology addiction. This may cause the social and emotional problems like estrangement of children. Likewise, it is seen from the findings of the study that the ICT usage among the children caused bad and unwanted behaviors such as easily throwing tantrum. It can be because children adapted the virtual environment instead of the real life.

The current study showed that the less movement, problems in motor skills, adverse finger, hand and eye development were the negative effects of ICT usage among the CWD. From the literature, studies on ICT usage and its effects on children'

development also showed the similar impacts. Karin (2017) mentions children are more passive while they use technological devices than traditional ways to entertain. Moreover, ICT usage among children causes obesity (APA, 2016; Wen et al., 2014), sleep deprivation (Cespedes et al., 2014), and eye health problems (Ekici, 2016). Moreover, apart from the negative effects of ICT usage, there is no evidence for the benefit of early exposure to ICT such as television (Zimmerman and Christakis, 2005).

5.3.3 Parents Perspective on the Effects of ICT Usage among the Children with Dyslexia

The study shows that the parents of the CWD have both negative and positive perspective on technology use among the children. Similarly, a research on parents view on ICT usage among children (Genc, 2014) shows almost 45% parents have negative feeling, nearly 25% feeling positive and almost 27% feeling neutral on Smartphone use by children. It can be seen from the findings that the parent thought ICT usage among the children has positive impacts on child development if it is used to assist in the development of the education rather than the entertainment.

It can be seen from the findings that parents preferred to control ICT usage of the children because of its negative effects on their development as supported the findings of Carlson et al. (2010), following and limitation by parents may decrease the negative usage of technology among children. The parents mentioned that timing and balancing ICT usage and indoor-outdoor activities were main factors to control the ICT usage among the children because the children were going to be technology addiction. Likewise, for the ICT usage among the children, parents concern physical and mental problems, isolated life-style, harmful radiation (Genc,2014), bad attitudes, addictiveness, language and speaking disorders (Yalcin and Erden, 2018).

On the other side, the study showed that parents can think it was normal parenting to put children in front of the TV for the entertainment when you get their dinner ready, while you are preparing work etc. to fill it times (Rideout, 2011). Kantarci (2018) also mentioned that some families prefer and support children to use technological devices because ICT usage do not make them very active, sweated or far from home. Therefore, these kind of attitudes by parent make children more addictive to use technology. Likewise, the parent who let her children to use ICT to fill her time suggested to control ICT usage of the children before they become addictive as her daughter was addictive to ICT usage.

The study showed that the parents let them their children to use ICT in order to make their own job easy, to entertain their children and to make them learned from the gadget, and to keep up with the technology before school age though they had also negative perspective on the usage. It can be seen from the findings that the parents preferred to used ICT for their children entertainment and development likewise the study by Turow and Nir (2000) that almost ninety percent of parents with internet connection in their home strongly or somewhat believed that technology help their children's academic achievement.

5.3.4 Teachers Perspective on the Effects of ICT Usage among the Children with Dyslexia

The study showed that the teachers suggested CWD should use ICT after school age even when they are teenager because they can use ICT to learn the sounds, the ABC song etc. , they can understand usage, and they can know what the positive and negative impact could be. Catchan (2013) also mentioned that students with special needs have the abilities to use interactive technology as well as teachers use it to adapt content depending on the children's needs or preferences.

It can be seen from the findings that the teacher suggested parents to control their children' ICT usage because most CWD don't really have good time management to balance overuse of technology, and contents of ICT are not just for children to learn and use. Furthermore, they should aim to improve their knowledge as ICT has rich resources like built-in multimedia database, apps and connections to internet that are support the children (Elazab Elshazly, 2016). Likewise, AAP (2016) reported parents should limit media use of children to about one hour in a day in a parent-child shared media use plan. In addition, Carlson et al. (2010) argues following and limitation by parents may decrease the negative usage of technology among children.

The study shows that the teachers have positive opinions on ICT usage among the CWD in addition to the suggestions to use it under control by parents. They mentioned ICT provides them rich information, songs for phonics, mathematics to be very helpful for their learning, some games for entertainment, multisensory perception, adaptiveness and learning (Madeira et al., 2015), and some interesting videos to learn in addition to improving their reading and writing skills (Drigan and Elektra, 2016) if parents offer sufficient content.

5.4 Implication of the Study

The results of study supported the Erikson's Psychosocial Development Theory and Bronfenbrenner's Ecological System Theory. Although, theories focus some different settings in development process. The study shows that perspective of parent on ICT usage among the CWD and children's own experiences have importance on the effects of ICT usage. That mentioned in the Erikson's theory that controlling and encouragement by the parents affect the development of the children. Moreover, it can be seen that environmental factors like parents, teachers, peers and ICT affect

the children development during the time and depending on the context as mentioned by Keyes (2000) that key players in the complex nature of the systems of Bronfenbrenner's theory are parents and teachers.

The findings of the study showed that positive effects of ICT usage on development of CWD came from useful applications and controlled usage although negative effects were because of incorrect ICT usage and bad contents. As seen from the findings, ICT keeps the children attention longer while it also distracts their attention. Similarly, attention is because of the multifunctional features of ICT that fascinate their attention on whereas distraction is because of the willingness of the children to use ICT. That means ICT can be beneficial for the CWD if it is not in the center of their life because of the overuse of ICT or early exposure of ICT usage. The findings also showed that neither teachers or parents suggested overuse or early exposure of ICT usage among the children.

Parents attention on ICT usage among the children have a big importance on the effects of ICT usage depending on the findings. The bad contents of the ICT that are used by the children caused negative effects towards the development although ICT has useful content to develop children' skills. While the content of the ICT caused mislearning or unwanted language development, it also caused social and emotional problems on the development of the children. That is why parents should control the contents and depending on the contents, and they should let children use ICT for a controlled time as suggested by the teachers.

Moreover, the working parents prefer to allow their children to use ICT devices to make their job easy in addition to making them occupied while they are working. That causes uncontrolled contents and usage time, and children are going to be more

addictive to use ICT in this case. That is why, for the development of the children, usage time, contents and features of the ICT are important for children development as well as their teachers and parents to control and organize them better.

5.5 Suggestions from the Study

The findings show that ICT usage among the CWD improves the holistic development. While ICT usage has positive effects on the development, it also helps for learning and teaching techniques as well as being an alternative way for development for all aspects. That means ICT can be used to develop cognitive, language, social emotional and physical development of the children as a learning and teaching ways. Parents and teachers can supervise children to use ICT as sufficient ways to develop a specific area in addition that they can use ICT to eliminate some struggles. For example, they can use e-reading applications from tablets to destroy the reading deficits of the children as studies showed that the apps help children for reading skills with shorter lines with more space and highlighted key points in on-screen text (Davson et al. 2018; Rello, Saggion, and Baeza-Yates, 2014).

Although the findings of the study show some sample of the negative effects for the holistic development of CWD, it is possible that ICT usage causes more and invisible problems on each developmental aspect. However, all negative effects on the development from the findings were related with contents of ICT and wrong ICT usage among the children. The result of the findings suggested teachers and parents to balance ICT usage and other activities in addition to controlling ICT usage among the children such as content of videos the children watch, time of usage (Korkmaz and Usta, 2010),), and distance between child eyes and screen.

Regarding the perspective of parents on ICT usage among the CWD, they suggested that children could be allowed to use ICT although CWD should use ICT after school age. However, the parents began to allow their CWD using ICT from early childhood age in order for entertainment, making them informed from the gadget, keeping up with the technology and to fill their time while working. The findings showed that parents felt disappointed for early ICT usage among their children as they were addicted to ICT. That is why they were suggested to control ICT usage by limiting time and balancing ICT usage and other activities. Thus, finding of the study support parents' suggestions of the ICT usage after school age for the development of CWD and controlling the usage for time and content. In addition, parent should search ICT applications that help child development and inform them for academic and daily life.

The study showed that teachers have more positive perspective of ICT usage among the children. moreover, they suggested CWD should be allowed after school age because they could understand how to use it and there were applications that supported academic achievement. However, they mentioned it could have positive effects on the development if parents and children knew how to use ICT and control the usage. The study supports the teachers' suggestion to control ICT usage by checking content and time.

5.6 Suggestions for Future Research

This section has several suggestions for the further research. This includes visiting the location of the study to observe parents and teachers for the interview before selecting volunteer participations. This is because some participants for the interview could be unfamiliar on the research topic although they were volunteer to

participate the interview. In addition to the early observing for the participant, time of the interview should be arranged not only by researcher and participants but also by the management of the school to create a best place to interview and collect clear data.

Another suggestion is that all parents should be clearly informed on the documents needed for the research during the meetings in order not to lost time as in addition to the interviews of teachers and parents, document analysis forms were used to collect data from the children daily lives to support the collected data from the interviews. Moreover, the further studies should focus on only one specific developmental area to have more clear data because it was difficult to research details for specific developmental area in the holistic research. In addition, the future studies may only focus on working or non-working parents as the results can change. Furthermore, this study did not link ICT usage among CWD and their classroom academic achievement at school and ICT tools did not categorized in the study. These should be explored in future research.

5.7 Conclusion

The study shows that ICT usage among the CWD has both positive and negative effects on the holistic development of them. In addition, the parents and teachers are aware of the effects of the ICT usage and suggest controlled ICT usage by parents and with balancing ICT usage and other activities for the development of the children.

As the literature does not have enough studies on ICT usage and its effects on the development of CWD and have some research on ICT usage of children without dyslexia, it can be seen that ICT usage among the CWD almost same effects on their development. However, these findings may not be generalized because a single case study cannot represent the whole.

It is hoped that parents and teachers will let their children after suitable age and control and even plan their ICT usage for their entertainment and developments. Moreover, it is hoped that more researchers in the future intent to study on ICT usage among the CWD and find more clear result on it. Consequently, ICT usage will help CWD improve holistic development in addition to the daily entertainment.

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