THE CONTRIBUTION OF COMPUTER SOFTWARE PROGRAMMES TO IMPROVING TEACHING PROCESSES FOR CHILDREN WITH DOWN'S SYNDROME: A STUDY OF SPECIAL EDUCATION CENTERS IN THE UNITED ARAB EMIRATES

By

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DEDICATION

This dissertation is dedicated to my younger sister, the one who inspired me to pursue this work; Shamsa Al Ghafry.

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The success of this research would not be possible without the help and support of the following people:

My family. To my mom, my dad, my brothers and sisters, I am very grateful that all of you were there for me while I was completing this study. I know I could not have done this without you.

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And of course, to the special needs centers who participated in this study.

DECLARATION

I declare that this dissertation was composed by myself and that the work contained herein is my own, except where explicitly stated otherwise in the text.

(Hamama Al Ghafry)

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ABSTRACT

Technology has always been considered as an empowering tool to guide learners during their studies. However, mentally challenged kids diagnosed with Down's syndrome do not always have the same opportunity to use technology and its products as compared to regular children. This study aims to develop new mechanisms that will aid children with Down's syndrome to gain basic knowledge by using computer software packages such as Microsoft Paint. The research methods of this study were designed to examine the application of computer software packages in teaching children with Down's syndrome.

A mixed methods approach was used in this study. A triangulation of the two research methods was utilised. For the quantitative part of the dissertation, a cross-sectional research design using a questionnaire survey was implemented while key-informant interviews were used for the qualitative method. Spearman's rank order correlation coefficient and content analysis were the two main quantitative methods used to analyse the data gathered.

The parents and teachers comprised the population involved in this study since they are the ones with firsthand experience in using computer software packages for teaching children with Down's syndrome. The results of the study demonstrate that effective use of computer software packages in special education facilities requires a joint effort between parents and teachers.

CHAPTER 1

INTRODUCTION

In school, children with Down's syndrome have traditionally been separated and removed from peer group literacy opportunities and expectations for the reason that they do not possess the same cognitive and physical capabilities as other children (Buckley 1995). Given this basic premise, it is often the concern of both parents and teachers who are handling children diagnosed with Down's syndrome on how to guide them and provide these children with the same opportunity as everyone else.

The desire to develop new means that will aid children with Down's syndrome to gain basic knowledge and skills such as reading, writing and numeracy, served as the main motivation for this study. To be more specific, the use of computer software packages such as Microsoft (MS) Paint, as a tool to both educate and entertain children with Down's syndrome serves as the focus of this study. The justification for this choice of software is personal in nature for the reason that the researcher has firsthand experience of how children with Down's syndrome are faced with the challenge of coping with academic learning, since my sister is diagnosed to have Down's syndrome and has been exposed to various teaching techniques in special needs centers located in the United Arab Emirates (UAE).

The underlying reality that children with Down's syndrome "intrinsically lack the cognitive capacity necessary to master the literacy skills and an aged-normed pace" (Cicceheti and Beeghly 1990) also serves as an impetus for this study because not being able to learn at the same pace as

regular children should not hinder special needs institutions from developing new techniques to foster learning among children with Down's syndrome. As previously mentioned this study is centered on examining how computer software packages improve teaching and enhance the experience by providing more avenues for learning in the case of children with Down's syndrome.

It is indeed of prime importance to determine how new technological developments like MS Paint can be utilised to benefit children with Downs's syndrome especially since Down's syndrome is believed to be one of the major causes of learning disabilities among children. In terms of the primary data collection for this study, the relationship between the use of computer software packages and improvements in teaching children with Down's syndrome was investigated exclusively in the context of special needs centers in the UAE.

In order to determine whether the use of computer software packages as a teaching tool in educating children with Down's syndrome is beneficial or not, this study relied on the use of a triangulation technique using both qualitative and quantitative research methods. For the quantitative aspect of the study, a self-administered survey was given to 100 respondents selected from various special needs centers in the UAE. The respondents were mainly special education teachers and parents of children diagnosed with Down's syndrome who are being educated in the UAE's special needs centers..

To supplement the findings of the self-administered survey, a qualitative approach in the form of the key-informant interviews was used for this study. The interviewees in the key-informant interviews were selected based on the findings from the respondents of the self-administered survey. The data for the self-administered survey were collected through the use of a semi-structured survey questionnaire, while the data from the key-informant interviews were tape recorded and transcribed verbatim.

1.1 Problem Statement and Research Questions

The main intent of this study was grounded in determining the effect of using computer software packages for improving teaching children with Down's syndrome in selected special needs centers in the UAE. In order to examine the effect of using computer software for teaching children with Down's syndrome, the following research questions serve as a guide throughout the study:

1. What are the ways by which computer software packages are used in teaching children with Down's syndrome?
   a. In what ways are computer software packages used as a teaching tool in special needs centers in the UAE?
2. How does the use of computer software packages improve teaching children with Down's syndrome?
   a. How does the use of computer software packages improve teaching children with Down's syndrome in special needs centers in the UAE?

The unit of analysis for this study was the individual for the reason that the respondents in both the self-administered survey and the key-informant interviews were individuals who have first-hand experience with regard to the effect of using computer software packages and are likely to benefit from improvements made in teaching techniques used for children with Down's syndrome. This choice of sample can also be supported by the fact that it is primarily the special education teachers who oversee and foster learning for children with Down's syndrome as well as the parents who constantly oversee the learning progress of their children.

1.2 Research Hypotheses

The data gathered from the self-administered survey and the key informant interviews will be utilised in order to examine the extent of the influence of computer software packages in improving teaching techniques for children who have Down's syndrome, and more specifically those children learning in special needs centers in the UAE. Hence, this research addressed the following hypotheses:

1. The use of computer software packages improves teaching methods used to teach and guide children with Down's syndrome.
2. The use of computer software packages improves teaching methods used to teach and guide children with Down's syndrome that are enrolled in special needs centers in the UAE.

Given these hypotheses the independent variable identified for this study would be the use of computer software packages such as MS Paint in order to enhance the learning and teaching process, particularly directed towards children with Down's syndrome. Meanwhile, the dependent variable would be improvements in teaching practice that in turn fosters improved learning on the part of students with Down's syndrome who are exposed to the use of computer software packages in classroom activities. The rationale behind this is that the use of computer software packages as an educational tool is understood to directly influence current teaching techniques used in special needs centers catering for children with Down's syndrome, and specifically in the UAE.

1.3 Research Aims and Objectives

First, this study aims to describe the current practice employed in teaching children with Down's syndrome and how these are influenced by the introduction of using computer software packages such as MS Paint in order to enhance learning on the part of the children. Second, this study seeks to examine whether the use of computer software packages, both as instructional and entertainment material, indeed improve teaching practice employed towards children diagnosed with Down's syndrome. More particularly, as has already been mentioned above, this study seeks to establish the effect of computer software packages in teaching children with Down's syndrome in various special needs center in the UAE. Third, this study is also motivated by the need to develop concrete suggestions as to how the use of computer software packages can be further incorporated in to teaching practice, particularly towards children with Down's syndrome not only in the UAE but in other areas as well. Finally, this study aims to provide new avenues for research and inspire other scholars to explore further the domain of technological developments and how these can be utilised to improve teaching practices towards children with Down's syndrome.

1.4 Scope and Limitations

The major limitation identified for this study would be that the empirical research is centered only in the UAE, particularly in the various special needs centers in the area. Also, since it requires specialist training and skills to research in depth the feedback and perception of the children with regard to how they are positively affected by the use of computer software packages, it was decided that it would be best to acquire the perception of special education teachers and parents alike, with regard to the

research problem identified in this study. Lastly, with regard to the validity of the selection of respondents for both the self-administered survey and the key-informant interviews, the scope of the study covers only respondents who have been exposed to the use of computer software packages in teaching children with Down's syndrome for at least one year.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Conceptualizing Down's Syndrome or Trisomy 21

The first stage of this literature review attends to identifying the basic conceptions and definitions attached towards Down's syndrome or Trisomy 21. The rationale behind this initial definition of terms is that prior to determining why it is necessary or beneficial to use computer software packages in teaching children with Down's syndrome, it is first essential to understand what Down's syndrome is. In this case, the description provided by Capone (2004) proves to be useful because it is based on the medical conception of Down's syndrome.

According to Capone (2004), Down's syndrome is a "chromosomal disorder that occurs in approximately 1 in 800 to 1000 live births". The abnormality often occurs in chromosome 21, which is the smallest human autosome that houses millions of genetic materials integral to cognitive development. Capone (2004) in his study attempted to establish a relationship between the Down's syndrome, as a medical condition, and the development of various intervention techniques that will foster better education for individuals diagnosed with Down's syndrome. Capone (2004) further asserts that Down's syndrome is characterised by developmental delay and is best understood as a syndrome complex that is rooted in heritability of human intelligence, particularly because Down's syndrome is often an indicator of learning disability.

The positive aspect of the study presented by Capone (2004) is that he was able to present Down's syndrome as a medical condition that can be addressed through proper therapy and intervention techniques. For instance, his findings indicate that children with Trisomy 21 differ significantly not only compared with typical children but also there is wide variation within their own group, particularly in terms of their neurobiological competence. Hence, it can be ascertained that not all children learn equally well at the same rates and this assertion achieves even greater importance in the case of children with Down's syndrome. Such observation can be supported further by the fact that children diagnosed with Trisomy 21 often have short attention spans and maladaptive behavior, which greatly compromises their learning ability.

As for the main research gaps identified in the study presented by Capone (2004), the major one that can be identified would be the approach he used in presenting the condition of Down's syndrome. Capone (2004) employed a highly medical understanding of Down's syndrome. An exclusively clinical approach often will miss some of the important social aspects of Down's syndrome, it should always be understood that a condition such as Down's syndrome cannot simply be viewed in terms of its biological characteristics but should be interpreted as involving an interaction of both social and biological conditions.

In another study, Madaule (1989) presented another characterisation of children diagnosed with Down's syndrome. Madaule (1989) states that children with Down's syndrome have slow processing skills which prevents them from hearing short words, such as conjunctions with articles that are critical to creating sentences. Hence, children with Down's syndrome often find it difficult to express themselves. Paterson (2001) identifies the reason for such difficulty to be rooted in the inability of children with Down's syndrome to communicate and acquire language skills. In the same study,

Paterson (2001) also stated that dissociations in abilities, particularly for children with Down's syndrome are likely to remain throughout adulthood. This is the reason why it is deemed necessary to devise intervention techniques that can provide support for children with Down's syndrome to perform well on tasks that involves assessing numeracy and words.

In relation to this, Madaule (1989) also provided an understanding of the physical characteristics of individuals with Down's syndrome. The physical aspect of Down's syndrome was not given much attention by Capone (2004) which is the reason why Madaule's (1989) study remains integral to this literature review. Physically, children with Down's syndrome have poor muscle tone, which often causes a distinctive posture of having a curved back and slouched shoulders (Madaule 1989). Poor muscle tone is also responsible for why children with Down's syndrome often keep their mouths open and have oversized tongues, which impedes with speech.

Given these basic physical characteristics, children with Down's syndrome often avoid verbal expression and other physical forms of socialisation. In the same study, Madaule (1989) introduced the Tomatis method which is grounded on sound simulation and counseling to help children and adults with Down's syndrome. The motivation behind methods such as the Tomatis method is that children with Down's syndrome should be given the opportunity to discover new things on their own and process information at their own pace.

The benefit of the study presented by Madaule (1989) is that he maintained a positive disposition with regard to the potential for development and learning within the Down's syndrome condition. Madaule (1989) stated that children with Down's syndrome often manifest a passion for music which makes sensory stimulation a good tool to foster learning and education. The motivation for the use of sensory methods like the Tomatis method is the need to provide children or individuals with Down's syndrome

with the opportunity to at least master basic social and life skills such as reading, writing and counting.

On the other hand, a limitation of the scope and purpose of the study presented by Madaule (1989) is that it was confined to the benefits of using the Tomatis method and other sensory based approaches towards guiding children with Down's syndrome into learning basic skills identified above. In this case, it should also be noted that though the benefits outweigh its costs, the Tomatis method still possesses negative attributes that need to be improved, and these negative consequences were not mentioned in the study published by Madaule (1989).

The research gaps identified in the study presented by Capone (2004) and Madaule (1989) with regard to the basic characteristics of individuals with Down's syndrome as well as potential treatments and approaches that will aid these individuals to cope with the rigours of daily life were addressed in the article written by Kliewer (1998). According to Kliewer (1998), Down's syndrome should not be confined to the highly objective domain of medicine and psychology.

Using a highly qualitative approach, adopting an interpretivist research position, Kliewer (1998) asserted that Down's syndrome should also be understood as social constructions and are culturally-bound, with its meanings based on historically situated perspectives that are constantly being negotiated and renegotiated between and amongst members of that society. One potential shortcoming of the points raised by Kliewer (1998) is that these are highly qualitative and idiographic observations thus lacking a homothetic empirical basis, particularly in the form of simple descriptive statistics that may or may not support his claims that the conditions attached to Down's syndrome are largely comprised of social constructs.

With regard to the contribution made by the study conducted by Kliewer (1998) its strength lies mainly in the methods of data collection that he employed; specifically participant observation and in-depth interviews. The explanation behind this is that the use of such phenomenologically based research methods enabled Kliewer (1998) to cite concrete examples of cases wherein Down's syndrome was greatly affected by the existing social environment especially in relation to fostering literacy and education. The results indicated in the cases discussed by Kliewer (1998) greatly contribute to the theoretical undertakings of scholars engaged in developing new means by which to improve teaching children with Down's syndrome.

2.2 Current teaching and intervention practices for children with Down's syndrome

This section of the literature review details the current practices associated with educating children with Down's syndrome, particularly through early intervention programmes. Hence, for this section, it is apt to begin with the article presented by Connolly et al (1993) wherein both the physical and intellectual abilities of children with Down's syndrome were examined in order to ascertain what areas of their development needs to be the focus of most immediate intervention. The study by Connolly et al (1993) was longitudinal in nature, meaning they examined the progress made by the children from early stages of the intervention, normally in early infancy and on towards their early childhood stage up until entering special needs centers to receive basic education.

Basically, Connolly et al (1993) believe that early intervention programmes will enhance the development not only of the motor skills of children with Down's syndrome but more importantly it allows them to

develop social skills and self-help abilities, all of which are integral to their growth as individuals and integration with the community and society as a whole. The long term effects of early intervention are critical at ages 3-6 for the reason that this is the period wherein cognitive and language abilities play a predominant role in both the intellectual and adaptive functioning of the child with Down's syndrome (Connolly et al 1993).

The positive attribute of the study conducted by Connolly et al (1993) is that they were able to predict the gains of conducting early intervention programmes in educating children with Down's syndrome. A problem in the design of the study by Connolly et al (1993) is that its experimental nature, working on a controlled group of participants and specifically children with Down's syndrome, was not able to fully provide a realistic understanding of the benefits gained through early intervention programmes in helping children with Down's syndrome to cope with the challenges of daily life. In terms of the validity and generalisation of the results study by Connolly et al (1993), they were also unable to present concrete cases that in the non-experimental situation illustrate the relevance and accuracy of the assertions that they made on the benefit of using early intervention programmes in educating children with Down's syndrome.

The inability of the research by Connolly et al (1993) to bridge the gap between theory and practice was addressed in an article written by Broadley and MacDonald (1999) which is directed towards using memory training as an intervention technique to foster better teaching and learning avenues for children diagnosed with Down's syndrome. Broadley and MacDonald (1999) used an initial sample of 63 children with Down's syndrome. This sample of children was subjected to a battery of tests in order to determine the memory capacity of children with Down's syndrome relative to established standards and also to determine their cognitive skills. It is a known fact however those children with Down's syndrome often have poor

sequential reasoning and auditory memory processes (Marcell and Armstrong 1982).

The findings of the study conducted by Broadley and MacDonald (1999) indicate that memory training for children with Down's syndrome is one of the effective intervention techniques for the reason that in order to guarantee effective teaching practice and learning processes, it should first be established that the children are able to remember the lessons and practices taught to them. For example, through memory training, it is known that teaching materials that are created and executed systematically and divided into smaller attainable sets are more effective in eliciting positive responses from children with Down's syndrome. In addition to improving their memory skills, the children also enjoyed the routine of doing memory activities (Broadley and MacDonald 1999).

One area still requiring more research evident in the study by Broadley and MacDonald (1999) is that they were not able to clearly identify the gains experienced by the children with Down's syndrome after being subject to intervention programmes that sought to improve their memory. Also, it would have been helpful if Broadley and MacDonald (1999) had been able to identify ways that enhancing the memory of children with Down's syndrome would be beneficial in other educational activities.

Moreover, Broadley and MacDonald (1999) also failed to develop recommendations as to how activities and various intervention programmes can be designed in order to further improve the memory of children diagnosed to have Down's syndrome. In particular, researchers, educators and parents need to know more about its practical application in daily activities as well as know how it can support and foster effective teaching and learning strategies. As for the strengths of the study by Broadley and MacDonald (1999), the fact that they were able to focus on the relationship between memory and education is already an achievement considering the

varying degrees of cognitive ability that children with Down's syndrome possess, which often makes it difficult for special education teachers to rely on just one teaching technique.

In another study, Buckley and Bird (1999) presented a more specific discussion regarding the importance of using various teaching methods in order to effectively ensure that children with Down's syndrome are given the quality of education that they deserve. Whereas Broadley and MacDonald (1999) focused on improving memory in order to enhance teaching practice and learning opportunities for children with Down's syndrome, Buckley and Bird (1999) concentrated their study on developing methods that will guide special education teachers when teaching children with Down's syndrome how to read. Buckley and Bird (1999) made several observations as to the factors that influence the progress of teaching techniques that are meant to guide children with Down's syndrome to learn how to read. These insights are presented below:

- *Reading errors*- It is a regular occurrence not only for children with Down's syndrome but even in typical children to commit semantic and visual errors. Semantic errors are when words with the same meaning but no visual similarity are interchanged (i.e. closed and shut). While visual error occurs when children confuse words that look alike (i.e. hair and drain).

- *Signing*- Children with Down's syndrome are more responsive to signs, particularly through the use of visual aids such as flash cards.

- *Reading enhances speech*

Based on the study by Buckley and Bird (1999), there are key areas that should be given attention when teaching reading to children with Down's syndrome. The benefit of Buckley's (2007) article is that it capitalised on the

reality that speaking and reading as well as comprehension is intertwined and it is inevitable that when addressing one area it cannot be done effectively without attending to its relationship to changes in the other areas as well. Children with Down's syndrome are educated in special schools for this very reason, that each of the critical areas (reading, identification of signs and speech) deserve careful consideration and attention on the part of the teacher.

Buckley and Bird (1999) cited actual cases of children with Down's syndrome who responded positively to the use of proactive methods such as using flash cards in teaching reading. The fact that the study was confined to the context of the UK is one possible limitation of the research, since it is very difficult to ascertain that children with Down's syndrome in other areas of the world, who live in different cultures will respond in exactly the same manner to the same teaching techniques as did the children who were the subjects in the study.

Aside from reading, writing and memory enhancement, another basic skill that should be developed in the case of children with Down's syndrome is numeracy or the "use of mathematics effectively in order to meet the general demands of life at home, in paid work and for participation in community and civic life" (Buckley 2007). In terms of creating intervention programmes in order to improve teaching numeracy to children with Down's syndrome, the study made by Buckley (2007) is of prime importance.

According to Buckley (2007) the numeracy achievements of children with Down's syndrome is lower compared to their literacy achievement which most probably indicates that it deserves extra attention from parents and teachers. In this case, Sue Buckley (2007) conducted a longitudinal study wherein she observed children with Down's syndrome throughout the process of learning numeracy in order to clearly identify what methods yielded the most impressive results. From her research study, Buckley (2007) was able to

identify that learning numeracy, as in the case of memory and literacy, is more effective when it is conducted in smaller sections.

Language and memory skills are important when learning numeracy skills, which is the reason why Buckley (2007) claimed that it is the most difficult aspect of teaching children with Down's syndrome. The reason behind this is the importance of prerequisite knowledge and skills in number and sequencing. The children must first learn the number words (requiring language and reading skills) and the count sequence (requiring memory skills) before they can adequately comprehend and perform numerical tasks.

As Buckley (2007) progressed in her study, she was also able to determine effective teaching techniques that enhance the learning of numeracy in the case of children with Down's syndrome. The first step of best practice is to subdivide Down's classroom tasks into smaller steps that are more manageable and less complicated. The second effective practice is to make use of computer software packages. Computer software packages have achieved positive feedback in the case of children with Down's syndrome because computer software interfaces and tools are often under the control of the child.

Therefore, the use of computer software packages gives children the ability to operate at their own pace and the computer gives them the time necessary to process information and respond to it (Buckley 2007). In addition to this, the computer mouse is also more convenient for children with Down's syndrome, who have poor motor skills, relative to using pencil and paper.

Buckley (2007) also presented numerous options that can be used to supplement the education provided in special needs centers. For instance, methods such as Kumon, Stern, and Numicon are also prevalent among children with Down's syndrome. Kumon teaches numeracy through the

conduct of daily repetitive activities, which are also meant to enhance memory activities for children with Down's syndrome. Meanwhile, Stern and Numicon use materials that allow children to learn numeracy or mathematics through their own discovery-based learning. Kumon, Stern and Numicon has yet to cause significant improvements in the learning of numeracy in the case of children with Down's syndrome, but Buckley (2007) is optimistic that in due time, these methods will lead to substantial improvements not only in teaching children with Down's syndrome but more importantly in fostering the advancement of our knowledge of the children and consequently a better appreciation of their needs, feelings and achievements.

The advantages posited by the study made by Buckley (2007) lie in the fact that it was able to explore new avenues by which teaching children with Down's syndrome can be improved, an example of this would be the use of computer software packages. New developments such as cooperating with other institutions like Kumon in order to improve teaching and to help children with Down's syndrome cope with basic learning needs and educational demands. As for the areas of research not directly addressed in the study, Buckley (2007) was not able to give coherent recommendations as to how the methods and strategies she identified in her article can be fully integrated into current teaching practices used for children with Down's syndrome. Of course, this should apply not only in the case of numeracy but in all principal aspects of learning, such as reading and speech.

Contributing to the same area of research as Buckley (2007), Hughes (2006) also made a study with regard to improving teaching practice in the case of children with Down's syndrome. According to Hughes (2006), teaching techniques for basic numeracy should be designed to adapt to the specific learning profile and individual abilities of the child with Down's syndrome. Hence, there is an urgent need to create accurate and informative profiles of children with Down's syndrome and from there develop new

teaching techniques that will equip these children with basic academic skills. the following conditions should be considered when endeavouring to improve teaching practice:

- *Social experiences and exposure to numbers in the pre-school years*

- *Teaching methods that employ a combination of visual and auditory techniques*

- *Relevance of the skills to be taught to everyday life*

- *Working memory capacity of the child-* since children with Down's syndrome have limited working memory, special attention must be given towards this problem of memory processing.

Hughes (2006) in an attempt to address the various concerns that confront scholars and special education teachers emphasised that structured teaching is the first step to be taken when handling children with Down's syndrome. Similar to Buckley (2007) she adheres to the use of technology such as computer software packages for aiding learning and enhancing teaching methods. One positive characteristic of Hughes' (2006) study is that after identifying the areas for teaching children with Down's syndrome which need improvement, she makes concrete suggestions as to how to improve these areas. A research gap in the study by Hughes (2006) was that she was not able to provide real life examples that clearly illustrate the precise execution of the suggestions she makes throughout the article.

2.3 Using computer software packages in teaching children with Down's syndrome

As was found by Buckley (2007) and Hughes (2006), the use of computer software packages for teaching children with Down's syndrome leads to positive feedback and outcomes. Further support for this approach is expressed by Lloyd et al (2006) who noted that children are now growing up immersed in technologies and these technologies have changed the day-to-day environment wherein learning takes place. In their study, Lloyd et al (2006) cited the *Latch-On* program, which is a post-school literacy program for young people with learning disabilities, as an example of computer software that advocates improved literacy and application of technology.

The findings of the study by Lloyd et al (2006) indicate that the benefits derive from using technology as an integrated part of a literacy programme for young adults with intellectual impairment. Examples of these benefits would be that computer software packages such as the Latch-On program provide greater motivation for the children to engage in new learning materials and activities and as a result become more interested in their lessons. An advantage of the study by Lloyd et al (2006) is that they presented both the positive as well the negative attributes of using computer software packages in learning activities.

For instance, in the case of children with Down's syndrome, they are known to have a diverse range of literacy abilities and computer skills, which makes it very difficult for the software to achieve the same response from different users. What might be a learning opportunity for some children might for others be plain entertainment. Therefore, it is essential for these learning intervention programmes to facilitate a wide range of skills and learning opportunities for their users. In addition to this, more research has to

be implemented to investigate the relationships between learners and computer software technology, particularly in the case of children with Down's syndrome (Lloyd et al 2006).

In another study, Bob Black (2006) sought to identify the numerous available computer software packages that can be used to foster a more productive atmosphere when teaching children with Down's syndrome. Aside from MS Paint, which is commonly used in order to encourage the creativity of the children, the computer software *Sound Beginnings* is also commonly used in teaching speech and vocalisation. The program *Sound Beginnings* enables children to select the appropriate sounds and words (Black 2006). It also encourages intensive language work by the children and facilitates learning and development. The interactive nature of computer software packages as well as the freedom it gives children to process the information matches the learning abilities of children with Down's syndrome, who have a shorter attention span and often will learn at a slower pace relative to typical children of similar age.

Another useful computer software program for educating children with Down's syndrome was developed by Resource Education in the UK, which is called *See it Say it*. This is probably the best single activity software program that aids children to enhance their vocabulary. Black (2006) identified some of the computer software packages that are prevalent in the special needs centers exploring new technologies to supplement their current teaching practices. There are many other software programs and interfaces, which have yet to be systematically studied by researchers and practitioners, especially in relation to their role and contribution for children with Down's syndrome.

Regarding the article by Black (2006) its strengths include the attention given to using technology for the benefit of individuals with Down's syndrome, particularly in giving primacy to total incorporation of

these techniques in learning activities. On the other hand, one drawback of Black's (2006) article is that he was not able to offer a detailed explanation of how the computer programs he identified are used in teaching students with Down's syndrome. Instead, he only indicated that these are the software programs used by institutions and failed to elaborate on the actual practice of using these software programs to aid children with Down's syndrome to gain basic life skills like reading, writing and mathematics.

2.4 The management of new software introduction and updates

This section will delve into a discussion of the merits of using information communication technology or ICT, particularly computers, as a means of enhancing students' learning in the school. Information technology has been found to be a powerful tool that bridges people together and allows them to access information on just about any topic or issue. The Internet remains one of the most influential technological advancements in recent history that have impacted on all walks of life.

But apart from the mere introduction of the ICT tools in the special needs classroom, there is also a need to emphasise continuous learning on the part of educators by encouraging them to manage the software properly and keep it at its most efficient state. In addition, the software must be routinely updated in order to ensure that it is installed with the latest useful features.

In the past, the Internet had been seen only as a tool for bridging people at the individual and later at the societal level. It has been summarily viewed as a technological advancement that can be used for purely scientific purposes. The advent of the Internet, however, has paved the way for the integration of a variety of other possibilities that can lead to human development. Not only has the Internet been used for purely private and

profitable ends, the same technology is also now being experimentally applied to all kinds of activities designed to further public welfare.

But schools cannot teach children about ICT if they do not have a computer laboratory on the premises. Even if children are already exposed to using the Internet at home, this should be complemented with proper training in school to help them to explore the learning possibilities offered by the Internet and computers in general.

Kiridis et al (2006) claim that the use of ICTs in the classroom helps students acquire greater confidence and pleasure in familiarising themselves with everyday ICT applications, as well as developing the evaluation skills to determine the potential uses and limits of these technologies. ICT skills are not stand-alone capabilities because they help hone other skills that can be useful for the students' learning, such as critical thinking, creativity and imagination.

But that is not to say that students, especially those who have special needs, can learn using the Internet and other ICT tools indiscriminately. For this reason, educators and parents also have to engage along with them in using these tools to gain maximum possible benefit. Managing the new software and keeping it updated throughout its use is as important as the initial launching that the teachers and parents make. This is because as new and more sophisticated technologies are developed, better features are incorporated into old versions of a particular software program. Regular updates as well as intermittent workshops for learning these new features are essential for the educators to maximise the learning opportunities offered by such ICT tools.

Apart from managing the software itself, the teacher must also plan ahead about managing the dynamics within the classroom to keep up with the activities that can be built around the said technology. For example, the

teacher will have to consider how to equally divide her students' time with the computer, as it may be impossible for everyone to use a terminal all at the same time. Dealing with technical problems and devising a proper grading system that can accurately reflect the evaluative measures for the target skill being learned with the computer software are also other factors that the teacher must consider.

Chapter Summary

This chapter has shown the practical and theoretical challenges that both teachers and students with Down's syndrome face inside the classroom, as well as the aid that computer software packages can provide to enhance and speed up the latter's learning process. Indeed, as new technologies are developed to assist in the learning experience of children with special requirements, there is also a need for educators and scholars alike to try and seek new ways to employ these technologies to their maximum capacity.

Given the limited capacities that students with Trisomy 21 have, computer software packages are a great way in encouraging them to make the most out of their school lessons. Learning with the assistance of computers and other ICT tools teach the student not just the target lesson, but other skills as well such as critical thinking and the ability to synthesise information from a variety of media. Thus, the literature points out that using computer software packages in the special needs classroom will bring about mainly positive changes and improved performance from the students.

CHAPTER 3

METHODOLOGY

3.1 Research Design

In this study, the researcher used a triangulation of both qualitative and quantitative techniques in order to ensure the reliability and the validity of its findings. Triangulation is defined by McIntyre (2005) as an approach by which researchers use more than one method to obtain data and to balance out the strengths and weaknesses of each research method. For the purpose of this research, the cross-sectional research design, through a self-administered survey serves as the main research design for the quantitative aspect while the key-informant interviews were used for the qualitative aspect, and also serve as a supplement to the findings generated from the self-administered survey.

Cross Sectional Design

The cross-sectional design involves the collection of information on a large number of cases at a single point in time in order to accumulate a body of qualitative or quantitative data in relation to a number of variables to discuss patterns of association (Bryman cited in Burnham et al 2004: p.45). Given this basic conception of the cross-sectional design, data is generated from a particular sample once only, compared to the longitudinal research

design that repeatedly collects data in order to determine changes in the respondents' behavior over a specified period of time.

The cross-sectional research design is normally used for convenience in explaining the vast scope of a particular phenomenon that occurs in a specific time and eventually leads to a variety of consequent cases that are impossible to study in totality given the probable need to use other additional methods and given a limited time span to conduct the study. This is the reason why it is often preferable to use cross-sectional methods when studying the perceived improvements obtained from the use of computer software packages for teaching children with Down's syndrome.

The cross-sectional research design serves as the main type of research design used in this study which is then supplemented by key-informant interviews. The cross-sectional design can be used to set the parameters of the study and limit its scope to particular areas in the UAE, specifically in selected special needs centers that rely on computer software packages to facilitate teaching children with Down's syndrome. The benefit of the cross-sectional design in this study is that it saved the researcher the time and resources to generate sufficient data with regard to obtaining the perceptions of special education teachers and parents of children with Down's syndrome on the benefits of using computer software packages as a tool for teaching in special needs centers.

Key-Informant Interviews

It has been previously mentioned that key-informant interviews were conducted in order to supplement the findings from the self-administered questionnaire survey. The explanation for this approach rests on the need to guarantee the reliability of the findings of the survey questionnaire hence it

was decided that an equal amount of weight would be given to the findings from the key-informant interviews. The advantage of using key-informant interviews is that the researcher can enjoy the advantage of asking questions that are readily available and comparable among subjects during analysis (Mutchnick and Berg 1996). This achieves even greater importance since the respondents for the key-informant interview are also drawn from the survey sample, which means that unclear responses in the semi-structured survey questionnaire can be clarified and explored further during the key-informant interviews.

In conducting the key-informant interviews the researcher may use both internal and external interviews. The participants for the internal interviews are from within the special needs centers, specifically, special education teachers who have firsthand experience of the effectiveness of computer software packages in fostering a better atmosphere for learning on the part of children with Down's syndrome. External participants, in this research setting, are those from the private sphere or the household of the child, more specifically parents who also have firsthand account with regard to the effect of using computer software programs in improving their children's academic abilities.

The advantages of the key informant interview are described by Mutchnick and Berg (1996) and include that it is a procedure wherein there are a series of predetermined questions but the researcher is at liberty to periodically deviate from the questions by asking follow-up questions whenever necessary. Thus, the key-informant interview schedule that was developed for this study was composed of both open-ended and closed questions. Specifically, the key-informant interview will verify the level of awareness and opinion of both the internal and external participants with regard to incorporating the use of computer software packages in the overall

teaching process for children with Down's syndrome that are being educated in special needs centers across the UAE.

The key informant interviews also featured a portion where the respondents were asked to describe their general views about using one of the most common computer software packages that they use with children afflicted with Down's syndrome. In this manner, the researcher was able to gather more in-depth information about the user's actual experience with the software, paying particular attention to features that are most helpful and suitable to the research problem at hand and to problems, if any, that the users have encountered while engaging with the software.

Only those who were included in the initial phase of the key interviews were likewise asked to elaborate about the chosen software program in order to avoid having a separate group of interviewees and to make the analysis easier to accomplish.

3.2 Method of Data Collection

Self-Administered survey

For the cross-sectional research design, the method of data collection used was the self-administered survey which is an appropriate research instrument for the quantitative aspects of the study. The self-administered survey in the cross-sectional analysis, also supplements the findings of the key-informant interviews and vice versa. A quantitative research design is applicable to the research problem addressed and enables the researcher to make use of instrumentation such as survey questionnaires in order to explore and compare and contrast the perceptions of a group of subjects in the study (Neill, 2007).

In employing the self-administered survey, it is important to take into consideration the population sample or the set of respondents who will respond to the questionnaire. Sample selection is pivotal in ensuring the quality of the findings as well as the validity and the reliability of the data used in the study. For the purpose of this study, the respondents were selected using the following methods:

Sample Selection

- **Theoretical Population**- Theoretically the total population that should be subjected to the self-administered survey would be all special education teachers as well as all of the parents who have first-hand experience with regard to the improvements brought by computer software packages in teaching children with Down's syndrome. The limitations set for this study makes this selection criterion impossible which is the reason why a sample population was selected.

- **Sample Population-** since it is difficult if not impossible to survey the theoretical population due to the time limitation and the financial constraints confronted by the researcher. A sample was selected to be representative of the general population with regard to the perception of the individuals on the improvements made by using computer software packages as teaching tools for children with Down's syndrome. The sample population for this study was limited to 100 respondents, consisting of teaching professionals in the domain of special education and parents of children diagnosed with Down's syndrome. The only additional restriction when selecting the sample population was that they should have had firsthand experience of the use of computer software packages to aid teaching children with Down's syndrome for at least one year. Meanwhile, all of the 100 respondents were determined

to be selected from various special needs center in the UAE that have been using computer software tools as part of their education programme for children with Down's syndrome also for a minimum of one year.

- **Sampling Design-** for the self-administered survey two stages of random selection was used. The first stage was through *systematic* random sampling of the special needs centers in the UAE area that are currently using computer software packages as a teaching tool in educating children with Down's syndrome. Systematic random sampling is a convenient and straightforward variation of simple random sampling where the researcher chooses a random starting place on the sampling frame and employs an interval to generate the necessary sample size (Burnham et al 2004). The second stage was proportional random sampling which states that the sample selected from each of the special needs centers should be proportional to the total number of potential respondents. As part of the conditions for ethics in social research, the identity or the real names of the respondents will be kept confidential unless permission from the respondent was obtained by the researcher.

Data collection for key-informant interviews

The participants in the key-informant interviews are selected based on the assessment of the researcher on how much information they would be able to provide in order to improve the findings of the study, specifically in terms of the benefits gained from using computer software programs in teaching children with Down's syndrome. It should also be noted that the participants for the key-informant interviews were identified based on the

results of the self-administered survey. The reason behind this is that the self-administered survey and the key-informant interviews are meant to complement each other. Hence, the key-informant interview serves as a mechanism to further explore and expound on the results of the survey or to clarify certain aspects with the respondents. As with the self-administered survey, the name and other personal details regarding the respondents were kept confidential.

As has already been mentioned earlier in this chapter, the researcher also deemed it important to check on the user acceptability of the computer software packages common used by children with special needs through the initiation of their parents and teachers. The researcher is particularly interested in the users' experience of MS Paint, which is a commonly-available and free graphic arts program that comes with computers installed with Microsoft operating systems.

The key informants for knowing about the frequency and quality of exposure of the parents and teachers with computer software packages that can help in the learning experience of children with Down's syndrome will be the same ones who will be asked to characterise their usage of MS Paint. In this manner, the researcher saves time by not selecting a separate group of respondents who can relate their experiences about using MS Paint, especially on their observations about the engagement of the students with the program. Furthermore, because the respondents at this stage have been chosen precisely for the wealth and depth of information they can share about using computer software programs in the special needs classroom, they are the best sources

It is important to know about the details of using MS Paint as a computer software program for enhancing the learning experience of the children because it will serve as a guide for developing teaching techniques and activities that are most suitable for a particular technological tool. In this

respect, the researcher is particularly interested in pertinent aspects of the software program, such as:

1. Ease of use.

2. Quantity and sophistication of functions.

3. Accessibility.

4. Ability to engage the interest of the user.

5. Flexibility and adaptability to certain activities.

3.3 Instrumentation

The primary research instrument used in this study was a survey questionnaire which was necessary in order to collect all of the needed information from the respondents involved. In this study, the researcher personally conducted the survey with the respondents in order to avoid the disadvantage of having a low response rate as can happen when the survey questionnaires are sent out in the mail to the respondents.

As it had been previously mentioned, the survey questionnaire had both closed and open ended questions. Closed questions are selected since it is easier to code and input data into computer software for processing when the respondent has been provided with a set of standard choices or options from which they select their answer. Meanwhile, open-ended questions are chosen because it permits the respondent a greater amount of flexibility and exercise of personal discretion when giving their answers (Mutchnick and Berg 1996).

For the instruments used in the key-informant interviews, a semi-structured interview schedule were constructed based on the research problem and particular questions from the survey questionnaire that were anticipated would require further elaboration. Also, since the interviews were tape recorded and transcribed verbatim, a tape recorder was also necessary during the whole interview process. Each key-informant interview covers a period of 30 to 45 minutes in length.

The key informant interview with the respondents on the features of MS Paint will entail an additional 15-20 minutes of their time, and will include mostly open-ended questions about the features and perceived problems of the program.

3.4 Methods of Data Analysis

Spearman's Rank Order Correlation Coefficient (r_s)

For data analysis, the results of the self-administered survey were ranked or ordered with respect to the degree or level of presence of the research indicators of the effectiveness of the use of computer software packages in fostering learning among children with Down's syndrome. Correlation coefficients for associations between variables were generated through the aid of the statistical software. Spearman's Rank Order correlation coefficient (r_s) was computed using the statistical software SPSS (Statistical Package for the Social Science) version 16, but for the benefit of the reader further explanation of the methods of analysis employed in this study the computational formula for Spearman's Rank Order (r_s) is given below:

$$r_s = 1 - \frac{6\left(\sum D^2\right)}{N\left(N^2 - 1\right)}$$

Where:
r_s= rank order correlation coefficient
D= difference between X and Y variables
N= total number of cases being studied

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The only requisite for the performance of Spearman's Rank Order correlation is that the data should be in interval level, which is satisfied in this research because ratio data falls under the interval level of measurements based on the condition that it employs equidistant intervals. The other requisite is that data should be collected through random sampling; this is also satisfied by the study.

Content Analysis

The data generated from the transcripts of the key-informant interviews were analysed using content analysis. The reason for the use of content analysis according to Marshall and Rossman (1995) is it is unobtrusive and non-reactive meaning that it can be conducted without disturbing the setting in any way. In this case, the researcher does not want to influence the perception of either the special education teachers or the parents regarding the desirability or otherwise of the incorporation of computer software packages in the overall teaching practice for children with Down's syndrome. Through content analysis, it is possible to examine the perception of the individual regarding the use of computer software packages as a teaching tool for educating children with Down's syndrome, and more particularly focusing in this research study on a sample population chosen from the special needs centers in the UAE.

Content analysis is useful for examining the underlying teaching practices in special needs center in order to clearly explain why it is necessary to incorporate developments such as computer software packages in the teaching process. Through content analysis, it will be easier to examine the receptiveness of the children with Down's syndrome to the use of computer software packages, based on the observation of their teachers and their parents, who were the participants in the key-informant interviews.

Given these considerations, content analysis helps to establish what aspects of the teaching process were positively or negatively influenced by the use of computer software packages and why such technological media development is appealing on the part of children with Down's syndrome. Content analysis also gave the researcher the opportunity to compare the perception of the special education teachers and the parents regarding the use of computer software packages, and how these two parties weigh its benefits and detriments relative to improving the capabilities of the child with Down's syndrome.

CHAPTER 4

RESULTS

4.1 Results of the self-administered survey questionnaire

For the findings of this study, the first section to be presented is the results of the self-administered survey questionnaire. Initially, there were 100 questionnaires (attached as Appendix A) distributed to the potential respondents sent by the researcher, but only 83 questionnaires were returned. Hence, there are 83 respondents to the self-administered survey that was given to teachers and parents of children with Down's syndrome who have had firsthand experience with the use of computer software packages to improve teaching and learning on the part of the children.

The respondents were asked to answer an 11 item semi-structured questionnaire containing questions that are intended to assess their level of familiarity and attitudes with regard to the use of computer software in fostering better learning on the part of children with Down's syndrome. Only 9 questions were presented in the frequency distribution tables while the other two open-ended questions are simply presented below:

1. In what ways do you think can the use of computer softwares in teaching children with Down's syndrome improve overall learning practice in special needs centers in the UAE?

2. How effective is the use of computer softwares in teaching children with Down's syndrome and helping them learn basic skills? Rate on a scale of 1-10 (10 being the lowest)?

All of the respondents are either teachers in special needs centers or are parents with children diagnosed with Down's syndrome and are given education at special needs centers in the UAE. The results of the survey questionnaire where analyzed through the use of frequency distribution tables and correlation analysis, using SPSS (Statistical Package for the Social Science) software version 16.

The first section of this section presents the descriptive statistics that accounts for the frequency (N), the mean and the standard deviation of each of the items in the survey questionnaire. To further illustrate these results, Table 1 is presented below. Moving on, the initial stage for this section presents the overall profile of results for the respondents which includes their sex and their relationship to the child with Down's syndrome, whether they are a teacher or a parent.

Table 1: Survey Variables, Frequencies, Range, Mean and Standard Deviation

	N	Minimum	Maximum	Mean	Std. Deviation
Sex	83	1	2	1.66	.476
Occupation	83	1	2	1.46	.501
1. Awareness to software use in teaching	83	1	2	1.08	.280
2. Personal experience on the use of computer softwares	83	1	2	1.01	.110

Table 1: Survey Variables, Frequencies, Range, Mean and Standard Deviation (Continued)

	N	Minimum	Maximum	Mean	Std. Deviation
3. Types of computer softwares used as teaching aid for children with Down's syndrome	83	1	4	1.54	.786
4. Ways computer software packages are used in teaching children Down's syndrome?	83	1	4	2.81	1.254
5. Use of computer software packages is helpful for teaching children with Down's syndrome	83	1	2	1.25	.437
6. Effectiveness of computer software packages in teaching children with Down's syndrome	83	2	10	6.52	1.797
7. The effectiveness of using computer software packages for teaching children with Down's syndrome in the UAE	83	1	4	2.29	1.153
8. Improvements in teaching related to use of computer software packages in special schools in the UAE	83	1	2	1.12	.328

Table 1: Survey Variables, Frequencies, Range, Mean and Standard Deviation (Continued)

	N	Minimum	Maximum	Mean	Std. Deviation
9. Areas of teaching children with Down's syndrome to be improved?	83	1	4	1.65	.943
10. Integration of using software packages to teach children with Down's syndrome in the UAE?	82	1	2	1.17	.379
Valid N (list wise)	82				

Out of the 83 respondents, 28 or 33.7% percent were male while the majority 66.3% were female. Meanwhile, 45 out of the 83 respondents were teachers accounting for 54.2% while only 45.8% or 38 out of the 83 were parents. In order to illustrate the general profile of the respondents with regard to their sex and their relationship to the child with Down's syndrome, a crosstabulation has been created and presented below as Table 2.

Table 2: Sex * Relationship to child with Down's syndrome (crosstabulation)

Count		Relationship to child with Down's syndrome		
		Teacher	Parent	Total
Sex	Male	14	14	28
	Female	31	24	55
	Total	45	38	83

From Table 2 it can be seen that the majority of the female respondents at 31 out of the 55 respondents are teachers while only 24 respondents are parents. The reason for this is that in the case of special education, the majority of the teachers are female because women are more responsive to occupations which deal with the needs of children. With regard to the parent respondents, Table 2 also illustrates that there are also more female respondents relative to men, again for the reason that mothers are more engaged and involved with the needs of their children concerning their day-to-day education. Finally, it should be taken into consideration when analysing the results that the ratio of male respondents to female respondents is weighted towards females, since overall there are more female respondents, and it is therefore to be expected that there will be more female respondents, either teachers or parents. In order to graphically illustrate this relationship, a graph has been constructed Figure 1.
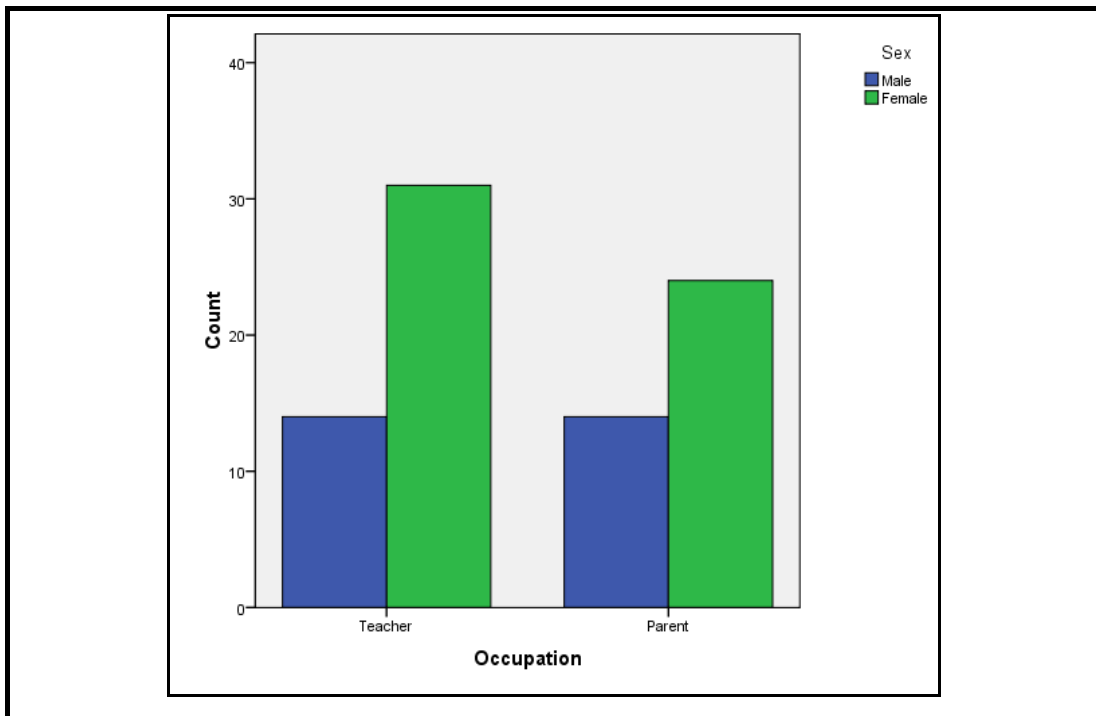

Figure 1: Sex and Occupation Relationship

When the respondents were asked for the types of computer software packages that they have been familiar with, especially those used as a tool to aid children with Down's syndrome, the majority (61.4%) identified MS Paint as the software they are most familiar with. The possible justification for this would be that MS Paint can be used to serve instructional as well as entertainment functions, which is essential to helping children with Down's syndrome cope with their learning difficulties. To further illustrate the answers of the respondents, Table 3 has been constructed and based on the frequency distribution of the answers, Sound Beginnings for reading and numeracy came in second to MS Paint with 25.3% of the respondents stating that they are also familiar with this software.

Table 3: Types of computer software packages used in teaching children with Down's syndrome

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MS Paint	51	61.4	61.4	61.4
	Sound Beginnings for reading and numeracy	21	25.3	25.3	86.7
	See it say it from Resource Education	9	10.8	10.8	97.6
	Others	2	2.4	2.4	100.0
	Total	83	100.0	100.0	

Another aspect of the survey questionnaire that should be given attention would be the overall perception of parents and teachers regarding the effectiveness of using computer software packages in teaching children with Down's syndrome, specifically in special needs centers in the UAE. It is illustrated in Table 4 that the there was no majority in the overall opinion given by the respondents, although nearly a third of the respondents (32.5%)

believe that computer software packages are very effective while 28.9% believe that it is effective with room for improvement. In this case, the cumulative percent of the respondents who believe that the use of computer software packages are effective in helping children with Down's syndrome cope with learning difficulties, comprise a majority at 61.4%.

Table 4: Effectiveness of using computer software programs in teaching children with Down's syndrome in the UAE?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Effective	27	32.5	32.5	32.5
	Effective	24	28.9	28.9	61.4
	Average	13	15.7	15.7	77.1
	Less Effective	19	22.9	22.9	100.0
	Total	83	100.0	100.0	

It can also be seen in Table 4 that 19 out of the 83 respondents or 22.9% believe that the use of computer software packages in special needs centers in the UAE for teaching children with Down's syndrome are less effective while 15.7% believe that computer software packages are averagely effective in eliciting positive responses from children with Down's syndrome. The possible explanation behind this is that the use of computer software packages in teaching children with Down's syndrome is a novel development in special education and has not achieved total integration into the systems of teaching and learning and has yet to be developed further in order to achieve higher levels of success.

The second section of this chapter is dedicating to reporting and analysing the findings from the Spearman's Rank Order correlation test which sought to establish the relationship between the use of computer

software packages in teaching children with Down's syndrome and was also intended to ascertain whether there were identifiable improvements in their performance. For instance, it is illustrated in Table 5 that there is a positive relationship between the level of awareness of the respondents with regard to the use of computer software programs in teaching children with Down's syndrome and their overall perception of the effectiveness of this technique in eliciting better responsiveness on the part of the children. The significance result of the correlation (Sig. 309) meant that the correlation coefficient ($r = .113$) is not a significant correlation at the 10% level ($p < 0.10$) but nevertheless there is still a positive relationship between the items identified in Table 5.

Table 5: Awareness and Effectiveness of Computer Software Packages (Correlations)

			Awareness of using software packages in teaching children with Down's syndrome	Effectiveness of using of computer software packages in teaching children with Down's syndrome
Spearman's rho	Awareness of using softwares in teaching children with Down's syndrome?	Correlation Coefficient	1.000	.113
		Sig. (2-tailed)	.	.309
		N	83	83
	Effectiveness of using of computer softwares in teaching children with Down's syndrome	Correlation Coefficient	.113	1.000
		Sig. (2-tailed)	.309	.
		N	83	83

The correlation coefficient was also computed for the general perception of the respondents on the effective use of computer software packages like MS Paint in helping children with Down's syndrome to get a better grasp of basic knowledge and skills such as in numeracy, reading and writing together with the more specific case of the effectiveness of the use of computer software packages in educating children with Down's syndrome in special needs centers in the UAE. Table 6 below shows a .153 correlation coefficient signaling a positive but weak relation. However, this relationship is non-significant even at the 10% level of probability ($p < 0.10$).

Table 6: Overall Effectiveness of Computer Software Packages (Correlations)

			Effectiveness of using of computer softwares in teaching children with Down's syndrome	The effectiveness of using computer softwares in teaching children with Down's syndrome in the UAE?
S p e a r m a n 's r h o	Effectiveness of using of computer softwares in teaching children with Down's syndrome	Correlation Coefficient	1.000	.153
		Sig. (2-tailed)	.	.168
		N	83	83
	The effectiveness of using computer softwares in teaching children with Down's syndrome in the UAE?	Correlation Coefficient	.153	1.000
		Sig. (2-tailed)	.168	.
		N	83	83

Based on the findings given in Table 6, there is a positive relationship ($r = .153$, Sig. .168) between the effectiveness of using computer software packages in teaching children with Down's syndrome and its overall effectiveness in the specific case of special needs centers in the UAE. The justification for this positive but weak and non-significant relationship and thus the lack of direct correlation would be that the use of computer software packages as a teaching aid is relatively new in special education, specifically in the case of children with Down's syndrome in the UAE. Given this premise, it should be taken into consideration that the positive relationship may illustrate that there is potential for more complete integration and incorporation of computer software packages in order to enhance teaching and learning on the part of children with Down's syndrome, specifically in the UAE.

When the respondents were asked for their opinion on the use of computer software packages and their helpfulness in creating more learning opportunities for children with Down's syndrome as well as their assessment of the effectiveness of using computer software packages in actual practice, specifically in educating children in special needs centers in the UAE, again, a low but positive correlation of .085 (shown in Table 7) was generated. This positive, non-significant relationship (Sig. .446) can be interpreted as meaning that computer software packages may offer countless benefits in terms of improving teaching basic knowledge to children with Down's syndrome, and the main aspect that should be given immediate attention is how to fully integrate these recent technological developments into actual teaching practice, which in this case would be in special needs centers in UAE.

Table 7: Helpfulness and Effectiveness of Computer Software Packages (Correlations)

			Use of computer software packages is helpful for teaching children with Down's syndrome	The effectiveness of using computer software packages in teaching children with Down's syndrome in the UAE?
Spearman's rho	Use of computer softwares helpful teaching children with Down's syndrome better learning responses from children with Down's syndrome?	Correlation Coefficient	1.000	.085
		Sig. (2-tailed)	.	.446
		N	83	83
	The effectiveness of using computer softwares in teaching children with Down's syndrome in the UAE?	Correlation Coefficient	.085	1.000
		Sig. (2-tailed)	.446	.
		N	83	83

An additional correlation was computed with regard to the relationship between the personal experience of respondents and the perceived effectiveness of using computer software packages in assisting children with Down's syndrome to acquire basic academic skills. Based on the data presented in Table 8, there is a positive relationship between having personal experience of using computer software packages in order to foster learning on the part of children with Down's syndrome and their overall perception of the effectiveness of such methods.

As with most of the other results, the correlation coefficient is .028 is not high and non-significant (Sig. .801), which may be interpreted as meaning that the attitude of the respondents on the effectiveness of using computer software packages in teaching children with Down's syndrome is influenced by whether they have had personal experience of its use. Personal experience regarding the use of computer software packages to improve learning and teaching children with Down's syndrome serves as a good starting point for informing both parents and teachers and encouraging them to be optimistic about its potential benefits once it has been more completely incorporated into the special education facilities.

Table 8: Personal Experience and Effectiveness of Computer Software Packages (Correlations)

			Personal experience in using computer software packages to teach children with Down's syndrome	The effectiveness of using computer software packages in teaching children with Down's syndrome in the UAE
Spearman's rho	Personal experience in using computer software packages to teach children with Down's syndrome	Correlation Coefficient	1.000	.028
		Sig. (2-tailed)	.	.801
		N	83	83
	The effectiveness of using computer software packages in teaching children with Down's syndrome in the UAE	Correlation Coefficient	.028	1.000
		Sig. (2-tailed)	.801	.
		N	83	83

4.2 Results of the key-informant interviews

For the key-informant interviews, the researcher scheduled 13 interviews, 7 of which are with special education teachers while 6 are parents of children diagnosed with Down's syndrome and are currently receiving education through the aid of computer software packages. Unfortunately, for one of the scheduled interviews one of the parents was not able to attend and therefore this interview did not take place. Hence, there were only 12 key-informant interviews for this study. The 12 key-informant interviews conducted for this study involved 7 teachers and 5 parents of children who have been diagnosed with Down's syndrome and had been enrolled in a special needs facility that uses computer software packages as a teaching tool.

The interviews lasted between 30-45 minutes wherein the researcher also functioned as the interviewer in order to have control over the type of follow-up questions asked. The researcher also sought the permission of the respondents to quote their responses in this study but in order to secure ethical considerations, their names are kept confidential. Instead, they are assigned numbers in order to differentiate them from one another. In this section, the answers of the participants will be presented based on their answers to each item in the in the semi-structured interview schedule.

In reply to the first question "How long have you been familiar or exposed with the use of computer softwares in teaching children with Down's syndrome?" the majority of the respondents, especially the teachers expressed that they are familiar with the use of computer software packages in educating children diagnosed with Down's syndrome for a couple of years since its inception and introduction into special education. For instance, Participant 8, a special education teacher for the past 8 years, said that: "I have been involved in computer software packages for the past five years.

Integrating technological discoveries like computer software packages, which can be used both to educate and entertain children, especially those with special needs, is the top priority of special education centres."

In line with this, Participant 9, a mother of an eight years old child with Down's syndrome, said that "My daughter has been exposed to the use of computer programs like learning drawing through MS Paint for the past three years and we have also used this approach at home for the past two years. My husband and I installed educational computer softwares such as Sound Beginnings which teaches her proper pronunciation". The replies given by the interviewees with regard to this question are similar to the findings given by the respondents from the self-administered survey. This confirms that both teachers and parents are aware of the use of computer software packages and have been exposed to it for the past couple of years and that many believe that there are still areas that should be addressed to further improve learning on the part of children with special needs.

In terms of the second question, which sought to identify the specific types of computer software packages used in teaching children with Down's syndrome, specifically in special needs facilities in the UAE, the participants in the interviews offered varying accounts on the types of software program that they are familiar with. Although almost all of the 12 interviewees mentioned MS Paint, software packages such as See It Say It produced by Resource Education were described as useful in helping children with Down's syndrome to develop listening skills and reading comprehension.

To support this, Participant 1, a special education teacher for the past two years, said that "In the institution where I am teaching, we use MS Paint to encourage the children to be creative and to be free to play with colors and shapes. The software Talking Stories is also used to give the children the opportunity to develop word recognition skills including building and understanding sentences". Furthermore, Participant 4, also a special

education teacher, asserted that "MS Paint is not always useful for educational purposes because it is centered on the art, the computer softwares used at the center are Telling Stories and Clicker, which are both softwares that develop speech and word recognition to special children".

The succeeding questions in the interview sought to get their perception of the respondents with regard to the effectiveness of the use of computer software packages in developing more avenues for education on the part of children with Down's syndrome. In terms of eliciting mastery and retention of the basic skills such as reading, numeracy and writing, computer software packages are believed to be useful, particularly in terms of giving the children the time to learn things on their own.

To support this, Participant 2, a father to a seven year old child with Down's syndrome that has been educated through the aid of computer software packages expressed the opinion that "Computer softwares are not only educational they are also helpful in teaching special children like my daughter to develop patience and discipline, which are both important in the learning process". Comments made by Participant 9 support this when stating that special needs centers are "Effective in helping children with learning disabilities because it allows them to not only learn but also to have fun and enjoy the learning process".

Based on the findings of the study, both for the key-informant interview as well the self-administered survey, the respondents seem to believe that there is potential for the use of computer software packages in teaching children with Down's syndrome, and are aware that there are still numerous areas that can be improved further. The idea behind this interpretation is that technology is constantly changing and new computer software packages are being developed, which means that special education facilities should be able to integrate these developments into their systems and at the same time guide their students and teachers to adapt to these

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changes. The challenge here, which might explain why the survey showed that respondents are not so strongly convinced about the use of computer software packages for teaching children with Down's syndrome, is to guide these children with learning to use the new software packages and versions that are released almost every year.

Under these basic conditions, Participants 7 and 8 shared cautionary opinions on further improving the use of computer software packages for teaching children in special needs centers in order to improve their skills of retention and facilitate greater learning. According to Participant 7, "Many education facilities for special kids do not comprehend the benefits of using computer softwares and implementing necessary updates and developments, this is why I believe that it is necessary to continuously improve this technology for the benefit of the children". Sharing the same perception, Participant 8 indicated that "computer softwares make children diagnosed with Down's syndrome learn lessons faster and become more responsive to basic language and numeracy skills because the medium is often new to them and it suits their learning abilities".

In relation to the question of whether the use of computer software packages in special needs centers can be further improved, the 12 interviewees are also asked for specific areas of special education that can be improved through the incorporation of computer software packages. For instance, Participant 10, a special education teacher for 6 years, said that "The primary area that should be improved in order to fully integrate computer softwares in educating children with Down's syndrome lies on the cooperation between parents and teachers, parents should be open to using the computer to help their children learn new skills and abilities that are in line with the methods employed in school".

In addition to this, Participant 6 shared that: "Another area that can be improved in order to fully utilise computer softwares in educating children

with Down's syndrome would be to train special education teachers on how to maximise the use of computer softwares to improve learning since there are still some teachers who would wish to rely on old methods in teaching children with special needs".

Moreover, in addressing the issue of improving and fully integrating the use of computer software packages in educating children with Down's syndrome, most of the parents interviewed gave cautious responses. For example, Participant 2 said that "If special needs centers want the use of computer softwares to work, it is not enough that they introduce these developments into the curriculum, what is more important is that they prepare the children and guide them to be more responsive to such techniques". Participant 2 further asserted that "Children with Down's syndrome often find it difficult to adjust to change and have breaks from routine. This means that for computer softwares to really work in giving them more opportunities to learn about numbers, colors, shapes and letters, teachers and parents alike must work hand-in-hand to make such developments helpful in addressing the varying needs of these children".

Finally, Participant 6, a special education teacher for eight years with experience of using computer software packages in teaching children with Down's syndrome for the past five years, asserted that:

> "Part of improving the use of computer softwares in teaching children with special needs require not only cooperation between parents, teachers and even the children. I think that the primary area that can be developed in terms of using computer softwares is that teachers like me should be given proper training and education as to how to incorporate and use these numerous computer softwares like Microsoft Paint and create better learning opportunities for the children."

4.3 Microsoft Paint—A user appraisal

Apart from asking the respondents about their generalised use of the abovementioned computer software packages, they were also asked to describe in great detail their experience with using MS Paint with their children. It is the general opinion of both parents and teachers that MS Paint presents an interesting alternative to using pens and paper for teaching the student about the illustrative arts.

Like other graphic arts software, MS Paint allows the user to make illustrations incorporated with text content by using a variety of tools similar to those that artists use in the real world. There are buttons or tools that resemble real-life art materials such as a brush, an eraser, a pencil and a paint bucket. Each of these buttons can be accessed with one click from the menu bar at the top of the page.

As Microsoft's operating systems evolve from Windows 98 to Windows 2000, XP, Vista and the most recent, Windows 7, MS Paint has also become more and more sophisticated to incorporate new features and a more user-friendly interface. The main objective of this software program is teaching the user some of the basics of computer-assisted graphic illustration. Most of the more advanced graphic arts programs such as Adobe Paintshop Pro or Correl have the same basic functions as MS Paint, so it is good to learn them using the latter program.

MS Paint is relatively easier to use because it has less sophisticated functions, thus giving the user an opportunity to learn basic painting tricks without taking too much toll on his time and concentration span. For some serious art enthusiasts, MS Paint may come off as an inadequate program because it does not allow them to tinker much with pictures, photos and text. But for art beginners and children with special needs, MS Paint provides the

perfect opportunity for mastering basic painting techniques as well as giving them a chance to express their creative talents and imagination.

At the same time, it is cheap and comes pre-installed free with any Microsoft operating system that you use, unlike other programs that have to be bought or downloaded from the Internet. With this in mind, parents and teachers can teach their children using MS Paint any time they want to. The program also features an extensive Help menu with topics ranging from changing the brush stroke selection to adding text to pictures to using different colors and patterns to fill in an illustration.

What can a child with Down's syndrome learn from using MS Paint? As has already been pointed out, the program allows children to express their ideas imaginatively and to learn some elementary techniques in computer-assisted graphic arts. For example, instead of asking a child to simply type their names using MS Word, they can be allowed to "draw" them instead using an MS Paint "canvas." The child can use different colors and brush strokes to go with his illustration, thus giving him the impression that he is not simply writing his name, but rather creating an expression of his personality through art.

In this activity, the researcher's sister (13 years old) was asked to use MS Paint to demonstrate the program's acceptability among users and to try different functions. The child already had a working knowledge of the program, so she was given a series of tasks over a period of time, and then asked to describe her experience of accomplishing the same. The user was asked to draw seven different shapes of their choice, fill them in with color, and then write a word in every figure. The whole activity was timed and observed to determine the user's difficulty with accomplishing the task given her.

After the activity, the user was asked to answer the following questions:

1.   Did you find the activity difficult?

2.   Did you enjoy drawing shapes and coloring them in?

3.   Do you prefer using pencils and paper over MS Paint in doing your artwork?

4.   Is MS Paint difficult to use?

5.   Do you want to work on art projects with a group using MS Paint?

The user noted that MS Paint was relatively easy to use, and given that she already had a working knowledge of the program, the task was accomplished in less than 20 minutes. She also disclosed equal preference for MS Paint and pen-and-paper art activities, because she said that they were both enjoyable to do.

Unlike using crayons, pencil and paper, MS Paint allows the user to erase or change his saved work with a few mouse clicks by undoing a number of actions. This function makes it easier to make any changes in the illustration at any stage of the activity. Or, if the user wants to have the same illustrated work with several minor differences, he can save each of them as a separate file with the differences incorporated in them. This way, the user does not have to make the drawing all over again and then add the small change that he wants to do. Most changes can also be manually undone by using the eraser button.

Sharing illustrated works is also easier because the user can send them to an email recipient as an attachment, or he can opt to save the file on a removable drive to store it in another computer in the future. Thus, the single

saved work can have many copies that the student can share with other people.

Instead of having to bring to school different kinds of art materials and tools, the teacher or parent need only boot the computer in order to teach the child about illustrative arts. MS Paint is a great way for children to learn different colors and their varying shades and hues, as well as play with textures and patterns using the program's color palette.

But apart from the obvious creative and artistic learning that a student can derive from using MS Paint, engaging in activities using this software also enhances the child's fine motor skills and hand-eye coordination. While the program uses virtual art materials, it does not take away the opportunity for the user to practice making precision movements because the mouse or pointing device still has to be guided in exact strokes to come up with the desired line, shape or pattern. It encourages hand-eye coordination because the child has to learn how to control the mouse to make small, precise movements.

Just as there are a multitude of advantages that can be had from using MS Paint in the special needs classroom, there are also certain drawbacks that have to be balanced with the benefits. For one thing, there may not be enough computers for all the students in the class to participate in the virtual art activities all at the same time. And unlike crayons that can be thrown in a tantrum, the teacher must be able to instill in the students the responsibility to take care of their respective computers. This may present restrictions for the program's use among a certain age group only, because younger students tend to be less mindful of how they go about their art activities.

Finally, using MS Paint also creates significant challenges for the parent and/or teacher to come up with new activities that can be incorporated with the program. Maximising the assistance of computer software packages

does not entail their simple application in the classroom, because techniques and activities have to be developed in order to create a fit between the target skill being learned, the tools used, and the activity for learning the skill.

Chapter Summary

The respondents for this study include 83 parents and teachers of students afflicted with Down's syndrome and who have had first-hand experience with using computer software packages within the context of the said child's learning process. Most of them were already adept at using MS Paint as an instructional and an entertainment tool for children.

However, no general consensus was reached with regard to actually determining whether or not computer software packages are more effective in eliciting responses from the students during lessons. This may mean one of two things—that computer-assisted learning is not all that helpful in special needs centers, especially in the UAE or that there is generally a lack of experience of using such computer software tools, thus explaining the respondent's unfamiliarity with its benefits.

Thus, there is a need to explore the potential advantages that computer software packages can offer to learners with special needs, such as students with Trisomy 21, as well as to teachers and parents who are personally guiding the education of these children.

CHAPTER 5

DISCUSSION

5.1 Computer Software Packages improve teaching practices for children with Down's syndrome

Based on the findings generated from the self-administered survey and key-informant interviews, the use of technological developments like computer software packages can create countless learning avenues for children with special needs such as those diagnosed with Down's syndrome. The fact that this study was centered on the case of special needs facilities in the UAE, provides concrete evidence that the use of such software packages is possible and that it has strong potential for helping these children to cope with their individual difficulties in the skill domains of numeracy, reading and comprehension and in other academic subjects.

Although the use of computer software packages for educating children with Down's syndrome offers a lot of benefits, it should be taken into consideration that children with Down's syndrome express varying needs which should become the priority of teachers and parents when selecting what is considered the most suitable computer software for them. Hence, the implementation requires different approaches to using computer software packages because it is important to allow children to maximise the individual learning opportunities through these new teaching and learning tools. This can be supported by the findings from the key-informant interviews wherein the primary concern raised by parents and teachers was not centered on the

effectiveness of the computer software packages in use but on the willingness and the responsiveness of the children to engage with these new learning activities, which are very different from the traditional teaching methods that they have become accustomed to expect.

The various software programs are intended to guide teachers and equip children with Down's syndrome to cope with the demands of education, particularly learning basic skills such as numeracy, colors, shapes and reading. Computer software packages that are used in special education such as MS Paint and Sound Beginnings are expected to be integrated with the development of more holistic approaches to teaching and learning. Computer software can create more opportunities for special education teachers when teaching children with Down's syndrome, especially in aspects of computer assisted reading, writing and comprehension.

Indeed there are good reasons why children with Down's syndrome are enrolled in special needs centers; fundamentally, their learning abilities are not the same as average children. Given this condition, it is the task of teachers as well as their parents to develop and explore new technologies that will enable them to give these children the best education and skills that they can have to help them deal effectively with the demands of daily life. Besides, not two children with Down's syndrome are exactly alike, and only rarely will two approaches to therapy and education be exactly the same (Gee 1999).

Therefore, the use of computer software packages should be given careful consideration so that they can be more fully integrated into the education system in the case of special needs centers in the UAE. The reason behind this is that computer software packages have the capacity to be able to cater to the varying needs and preferences of students in such a manner that will allow them to learn life skills and experience a more effective education. It follows from making this assertion that computer software packages should

be tested and scrutinised by special needs facilities before being incorporated more widely into teaching processes across the country. The rationale for this prior planning and testing is to ensure that these computer software packages will be appropriate not only to the cognitive abilities of these children but also to their physical abilities and preferences.

As has been discussed in the literature review and explored in the research, reading, writing and memory enhancement are important skills that should be taught to children with Down's syndrome. The traditional approaches in teaching these include the use of flash cards and writing on the blackboard. Since the development of computer software packages such as MS Paint and Sound Beginnings (illustrated in Figure 2 and Figure 3), which has been frequently mentioned in the findings of this research, traditional methods in teaching reading, writing and memory enhancement have been used less frequently.
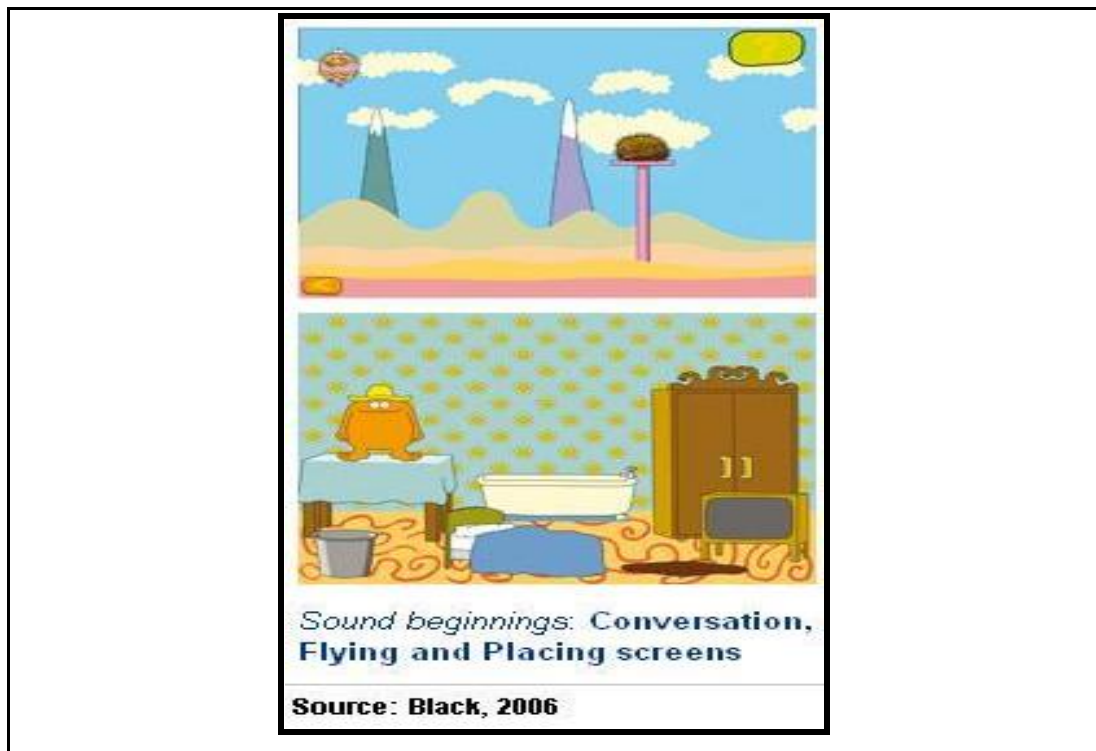

Sound beginnings: Conversation, **Flying and Placing screens**

Source: Black, 2006

Figure 2: First snapshot of *Sound beginnings* Software

Figure 3: Second snapshot of *Sound beginnings* Software

These pedagogical and educational developments can be considered as improvements in teaching practice in the UAE because computer software packages are often found to be more efficient in assessing and responding to the varying needs, pace and learning demands of children with Down's syndrome. For example, in the computer software *Sound Beginnings*, it allows the child to select the appropriate sound and associate these sounds to the matching word. In the case of the children with Down's syndrome, aside from giving them time to grasp the operations of the software, programs such as *Sound Beginnings*, are helpful in teaching children with Down's syndrome because it gives them the freedom to learn at their own pace and also the opportunity to have fun while experimenting with sounds that are integral to speech development.

As was mentioned in the report of the findings from the survey and the interviews the main areas of teaching children with Down's syndrome that are greatly enhanced by the use of computer software packages are reading and comprehension as well as associating and recognising colors and shapes. The use of interactive methods made possible by MS Paint and Sound Beginnings and other computer software packages that seek to perform

similar functions, are beneficial in encouraging children with Down's syndrome to enjoy the learning process and not perceive it as a burdensome activity.

Another aspect of using computer software packages when educating children with special needs is that it offers benefits not only for children but also for teachers as well. This mutual benefit serves as an explanation and justification for why numerous special needs centers, in the UAE and in other countries, are installing and using computer software packages to help their students acquire basic knowledge and skills in the areas of literacy and numeracy. Again, the primary benefit offered by computer software packages in educating children with Down's syndrome is that it gives them control on the progress of the learning process. This is also in line with the reality that children diagnosed with Down's syndrome are educated through forms of delivery that divide learning tasks into smaller steps, which are more manageable for their memory and learning abilities.

The use of computer software packages in teaching children with Down's syndrome as in the case of special needs centers in the UAE are also beneficial because this computer mediated approach can be more sensitive to the physical capabilities of these children. As has been presented in this study, children with Down's syndrome often have poor motor skills, which impede their ability to perform school related tasks such as writing using pen and paper. This is the reason why computer software interfaces can become more effective teaching tools for children with Down's syndrome because the computer tools such as the mouse makes it easier to maneuver and are less tedious and more convenient. As a result, children with Down's syndrome who are taught through the aid of computer software packages are less concerned with the physical hindrances that might occur in the learning process, instead, they can allocate their attention to processing the information and responding to the challenges on computer more effectively.

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A concrete example of a computer software package that offers this benefit for educating children diagnosed with Down's syndrome, as in the case of special needs centers in the UAE that were subjected to this study, are *Switch it* software programs such as Bob the Builder (illustrated in Figure 4). Computer software packages such as MS Paint and Bob the Builder equip students with learning disabilities to make associations between figures and real objects, which is essential for them to be able to apply the knowledge gained in school to their everyday lives.
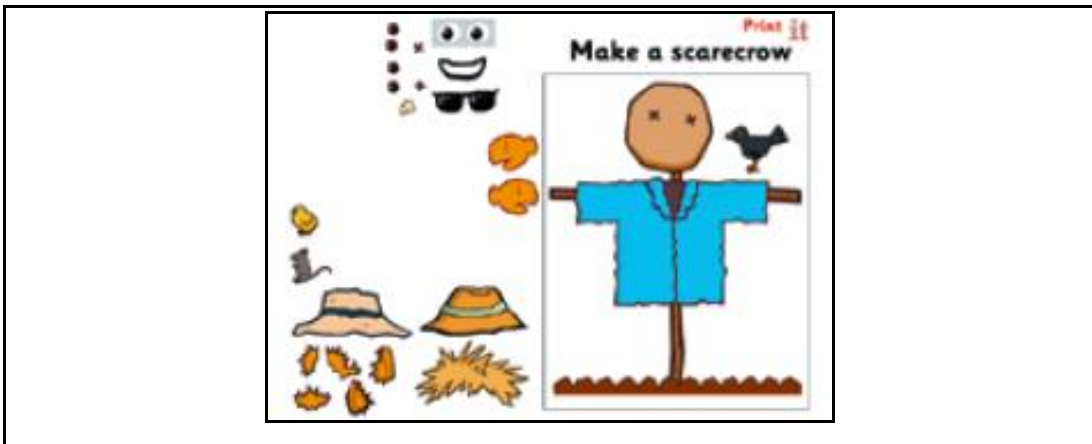

Figure 4: Snapshot of *Bob the Builder* Software

As it had been repeatedly stated in the findings of this study, as well as in the literature review, the main advantages presented by the use of computer software packages in educating children diagnosed with Down's syndrome include flexibility and individualisation of the learning. These conditions are especially important in the case of special needs centers in the UAE, what is required are software packages that support teachers with assessing the individual abilities of the child and then help them to develop techniques that will maximise each child's learning potential.

5.2 Computer software packages are effective mechanisms for intervention programmes in special needs centers in the UAE

Based on the literature reviewed and the data gathered by the self-administered survey and the insights generated from the key-informant interviews, the use of computer software packages in educating children with Down's syndrome in the broader sense is a good tool for learning interventions. The justification for this claim is that computer software packages maintain a record of the performance of the children every time they engage in the computer software activity. Through this activity log, teachers and parents alike have a systematic means of effectively assessing both the physical and the intellectual abilities of the children diagnosed with Down's syndrome. Such forms of computer tracking and assessment are necessary in order to identify the areas that require extra attention as well as the strengths of the children that can be developed even further.

From the results of the self-administered survey, it became apparent that the respondents are ambivalent about the success of fully integrating computer software packages into the education of children with Down's syndrome. One identifiable explanation for this viewpoint is that its use requires continuous adaptation to technological developments in the computer software packages used, often leading to re-orienting the students again in how they can be used and updating or re-training the teachers and the parents, if they want to create a conducive learning environment for these children.

For example, as was previously mentioned in this dissertation, children with Down's syndrome often have poor working memory skills and this is apparent whenever it takes them a long time to finish tasks involving numeracy and counting or in processing visual and auditory information. The

use of computer software packages makes keeping track of the progress of children with Down's syndrome easier, especially in terms of developing skills in numeracy, visual and auditory memory. This achieves even greater significance in the context of classroom settings where the teacher is tasked to handle and educate more than one child diagnosed with Down's syndrome. Computer software packages enable the teacher to attend to the needs of the children individually based on their performance and their responsiveness to the classroom-based educational activities.

It has been are continual theme of this study that computer software packages not only improve education but more importantly also function as an intervention mechanism. Under these conditions it is essential to understand that educating children with Down's syndrome should be done through early intervention programmes. Early intervention programmes for children with Down's syndrome often occur during the first few years of childhood and the use of various computer software packages both at home and in school enables children to cope with their difficulties even easier. The only drawback in terms of using computer software programs for children diagnosed with Down's syndrome is that it does not provide sufficient avenues that will help these children to develop their interpersonal social skills and self-discipline when in the company of others.

Computer software packages often involve the child interacting with the machine, which has some benefits since it allows the child with Down's syndrome to figure things out on her own but it also potentially reduces the child's time available for interacting with other individuals. Effective intervention for children with Down's syndrome involves not only equipping them with basic academic skills but more importantly in guiding them to develop their social skills.

The issues of independent learning and development of social skills can be supported by the findings of the self-administered survey and the key-

informant interviews both which provide evidence that the use of computer software packages can be beneficial for educating children with Down's syndrome, specifically in the case of special needs centers in the UAE. The need to integrate a social aspect to the use of computer software packages was also raised in the data collected in this study and the opinion most often expressed by the participants was that the use of computer software packages for teaching children with Down's syndrome can be improved further as time progresses.

The need to secure both the effectiveness of computer software packages in aiding children with Down's syndrome to cope with basic academic demands as well as to develop basic social skills should be the priority of special education facilities. The reason for this is that skills such as mathematics, reading and writing, and the necessary social skills to interact with people are essential for children with Down's syndrome because it allows them to cope with the events and demand that occur in their daily lives.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The case of special needs centers in the UAE that are ardently incorporating the use of computer software packages in their teaching and learning systems can be considered as possessing an element of risk because these institutions are willing to take the risk that the children might not be responsive to the introduction of these new technologies. The self-administered survey and the key-informant interviews conducted on parents and teachers who have firsthand experience of the benefits offered by computer software packages in educating children with Down's syndrome in the UAE illustrates that technological developments may serve as a great opportunity for new learning intervention programmes grounded in enabling these children to acquire basic and academic skills.

There are numerous ways in which computer software packages can be integrated into educating children with Down's syndrome. As shown in the findings of this study, computer software packages are used to aid children with Down's syndrome to learn basic skills in numeracy, reading comprehension and as the packages become more focused on social media even social skills. The rationale behind this approach is that children with Down's syndrome often have varying levels of learning abilities which should be taken into account by teachers in special education facilities. The case of special needs facilities in the UAE illustrates this condition specifically when computer software packages are utilised not only for school education purposes but more importantly to aid children develop basic and life skills such as self-discipline and independence to process

information on their own and at their own pace. Again, this serves as good practice because it shows that the benefits offered by computer software packages in teaching children with Down's syndrome outweigh its costs, which also suggests that it should be developed further as time progresses.

Based on the results of the self-administered survey as well as the key-informant interviews, it was consistently made evident that in order to fully integrate computer software packages in special education facilities, it has to be a joint effort between parents and teachers. The reason for the positive attitude towards the use of computer software packages in educating children with Down's syndrome, particularly in the case of special needs centers in UAE, lies in the fact that any development that would improve teaching practice for these children are likely to be willingly and enthusiastically explored and developed. In this case, both teachers and parents of children with Down's syndrome share a common goal to work towards improving teaching and learning practice in special needs facilities through the aid of computer software packages.

The primary goal of using computer software packages in special education is to improve teaching methods and move from the use of traditional teaching techniques such as flash cards into more efficient forms such as computer software packages even if the adjustment period may require additional effort and resources. In order to address this need for technological development, the common suggestion that surfaced all throughout this study would be to reinforce good practice and create more avenues for parents and special education teachers to help each other in educating children with Down's syndrome to capitalise on the benefits offered by the use of existing computer software programs as an integral aspect of the learning process.

With these things taken into consideration, after assessing the specific practices employed by special needs centers in the UAE with regard to the

use of various computer software packages to teach children basic knowledge in numeracy and audio visual recognition, it can be concluded that the use of computer software packages and other relevant technologies indeed positively contribute to the teaching and learning process for children with Down's syndrome. Through coherent policies and practices employed by special needs centers in the UAE consistent with the direct participation and training of special education teachers and parents alike in optimising the use of computer software packages can be expected to open up new learning opportunities for the children.

For the recommendations section of this dissertation, four areas are covered ranging from the macro level to the micro level of analysis, beginning with the government, teachers and special education facilities, parents and finally the children themselves. In this case, the primary recommendation is for the government to develop policies that will encourage the use of technological developments such as computer software packages for the purposes of special education. It will also be helpful to allocate additional budget and resources for research and development that will ascertain the continuous progress and improvement obtained from using computer software packages for fostering knowledge and learning in children with special needs, and Down's syndrome in particular.

For teachers and special needs centers, specifically those located in the UAE, the recommendation is to develop more software programs and learning activities that involve teachers and parents in exploiting the benefits of computer software packages for educating children with Down's syndrome. The justification for this proposed action is that both parents and special education teachers greatly contribute to the success or failure of integrating computer software packages such as MS Paint into special education.

Instead of promoting a learning atmosphere that is highly dependent on how the teacher presents the lesson to the child, the use of computer software packages enable the child with Down's syndrome to rely on his/her individual capacity and ability to process information based on her skills and independent observation and action. The determining factor here would be the willingness of parents and teachers to be more open to using new technologies and actively participate in programmes that will incorporate and explore the benefits offered by using computer software packages as a teaching tool.

The second recommendation for teachers and education institutions regarding this issue is to develop research and education programmes that will continuously explore the benefits of technological developments such as computer software packages for helping children with special needs to cope with the rigours of daily life and special education and learning. Since one of the problems identified with the use of computer software packages is its lack of social aspects, it is suggested that increased research attention be devoted to making these software packages more interactive with other people. The term interactive pertains to enabling the children, especially those with Down's syndrome, to develop better social skills and be more open to interacting with the people around them.

The recommendation for parents with regard to the use of computer software packages in educating children with Down's syndrome lies in the practical level of simply by encouraging them to be open to the use of these new technologies and helping their children cope with learning disabilities and acquire knowledge faster and at a pace that they are comfortable with sustaining. It is also advisable for parents to have their own computers at home and install the same educational software packages in order to present continuity between school and home in the process of teaching children with Down's syndrome.

On the part of the children, the recommendation made for this study is based on encouraging them to be open to using computer software packages as an integral aspect of their education. Of course, this goes hand-in-hand with the need for these software packages to be appealing and functional from the perspective of the children. In addition to this a holistic approach should also be employed by both parents and teachers in order to guide the children with Down's syndrome to maximise the benefit of using computer software packages in their daily learning activities.

The final recommendation for this study focuses on bridging the gap between theory and practice, particularly in the methods used for research. Since the aim of this study is to aid special needs centers to maximise the availability and functional application of computer software packages and to use them to improve teaching practice. It will be helpful for future studies to rely more on participant observation in order to generate first hand information on how children with Down's syndrome respond to various computer software packages that are used in teaching them to cope with basic and academic learning and social activities.

In summary, in order for computer software packages to fully contribute to the success of teaching children with special needs, such as those diagnosed with Down's syndrome, it is not sufficient that special education centres possess the most advanced technology. Rather, it is the willingness of teachers, parents and the children themselves to adopt these software packages and utilise them to their maximum potential that will determine the overall amount of success in the domain of special education.

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APPENDIX A

SURVEY QUESTIONNAIRE

Name (optional):_____

Sex: [ ] Male   [ ] Female   Age: _____

Civil Status:_____

Occupation (optional):_____

1. Are you aware of the use of computer softwares in teaching children with Down's syndrome?

    [ ] Yes   [ ] No

2. Do you have personal experience on the use of computer softwares to foster learning on the part of children with Down's syndrome?

    [ ] Yes   [ ] No

3. What are the types of computer softwares used as teaching aid for children with Down's syndrome are you familiar with? (Check all that are applicable)

    [ ] MS Paint

    [ ] Sound Beginnings for reading and numeracy

    [ ] See it Say it from Resource Education

    [ ] others_____

4. In what ways are computer softwares used in the process of teaching children with Down's syndrome?

[ ] reading and comprehension

[ ] Numeracy

[ ] Colors and Shapes

[ ] all of the above

[ ] others_____

5. In your opinion, do you think the use of computer softwares is helpful in fostering better learning responses from children with Down's syndrome?

[ ] Yes   [ ] No

6. How effective is the use of computer softwares in teaching children with Down's syndrome and helping them learn basic skills? Rate on a scale of 1-10 (10 being the lowest)? _____

7. How would you assess the effectiveness of using computer softwares in teaching children with Down's syndrome in special needs centers in the UAE?

[ ] Very Effective [ ] Effective [ ] Average [ ] Less effective [ ] Not effective

8. Do you think the use of computer softwares in teaching children with Down's syndrome can be improved further?

[ ] Yes   [ ] No

9. What areas of teaching children with Down's syndrome are improved through the use of computer softwares in special needs centers in the UAE?

[ ] numeracy

[ ] colors and shapes

[ ] reading and comprehension

[ ] self-discipline

[ ] others _____

10. Do you think the use of computer softwares can be fully integrated in teaching children with Down's syndrome in special needs centers in the UAE?

[ ] Yes   [ ] No

11. In what ways do you think can the use of computer softwares in teaching children with Down's syndrome improve overall learning practice in special   needs   centers   in   the   UAE?

_____

_____

_____

**************************THANK YOU************************

APPENDIX B

INTERVIEW QUESTIONNAIRE

1. How long have you been familiar or exposed with the use of computer softwares in teaching children with Down's syndrome?

2. What are the specific types of computer softwares used in teaching children with Down's syndrome in special needs facilities in the UAE?

3. What is your assessment of the effectiveness of using computer softwares in aiding children with Down's syndrome in special needs facilities?

4. Do you think these methods are effective in eliciting retention and foster mastery of the basic skills such as reading and numeracy to children diagnosed with Down's syndrome in special needs facilities in the UAE?

5. Do you think the use of computer softwares in teaching children with Down's syndrome be further improved in order to facilitate better learning and retention of basic language and numeracy skills?

6. In your opinion, in what ways can the use of computer softwares be improved to increase its effectiveness in helping children with Down's syndrome cope with learning and school activities?