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Intervention for Children with Specific Learning Disabilities (SpLD) in Mathematics Disorders: A Framework

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Abstract

For children with learning disabilities, the opportunity to achieve self-determination may help to enhance their own personal satisfaction. To accomplish personal satisfaction and independence, children with learning disabilities need comprehend the learning principal ability framework. Since the calculation is utilized as a part of ordinary living, understanding the essential estimation aptitudes restricted children with learning disabilities can help achieve their personal satisfaction. For children with learning disabilities, learning basic counting skills are important not only for their academic careers but also for their daily life. This study is to investigate the effectiveness of the intervention program on the children's basic calculation and the type of category disability. The intervention will test teaching with technology and interactive directed teaching. The category of disability in this study is divided into four types: Attention Deficit Hypertension Disorder (ADHD), Autism, Dyslexia and Down Syndrome. A theoretical framework for intervention for children with learning disabilities is proposed from the outcome of this study. By comparing which intervention is suitable for each type category disability, will help teachers choose the right instruction in learning process and also may help children acquire the essential skills they in the future.

Keywords: Basic calculation, intervention, learning disabilities, mathematics disorder

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1.0 INTRODUCTION

Children with Specific Learning Disabilities (SpLD) are usually defined through negation. In other words, those children who have less than average intelligence and whose learning difficulties are not explained through visual or hearing difficulties, health problems, emotional and behavioural difficulties or socio economic disadvantage, (Ayers, 2006). Children with SpLD may experience emotional and behaviour difficulties due to their specific disabilities.SpLD have particular impairments in accessing the non-symbolic meaning of numerosities, but the differences existing between these children and their normal developing counterparts are not due to their low Performance IQ.(Mammarella et al., 2013). This paper focuses on the four categories of disabilities: Autisme, Dyslexia, Attention Deficit Hyperactive Disorder (ADHD) and Down Syndrome. These categories have their own disabilities and characteristics.

The importance of understanding the basic Mathematical concept is needed in learning process. Without these skills, children will not be able to get gainful employment or manage their daily finances. These are true for those with disabilities or those who cannot afford to hire someone to assist them to manage their finances. The importance of understanding of mathematics concepts are also documented by(Dupaul et al., 2006). Mathematics important because the use of number in daily life. The need to help Children with SpLD in mathematics is supported by other researchers (Siegel & Ph, 2008; Zerafa, 2011; Zion, 2007).

Mathematics instruction for diverse learners can be a challenge. Knowledge and specialists are needed who are committed and accountable (Garderen, Scheuermann, & Jackson, 2012). Many of the resources and materials are available to support teachers' expertise in content development, characteristics of different students, technology and pedagogy. The need for effective teaching methods designed to meet the specific needs of those who will provide the successful development in their education and in the outside world is important(Pesova, Sivevska, & Runceva, 2014).

The aim of this study is to investigate the achievements of children with SpLD in basic calculation through the intervention program. This study also examines the relationship between the achievement of children with SpLD in the calculation and intervention program. The intervention covers using Technology and Manipulative. Figure 1 shows the conceptual framework and its relationship with one other.



Figure 1 Conceptual framework for this study

2.0 SPECIFIC LEARNING DISABILITIES (SpLD)

Dyslexia

Children with Dyslexic often have problems with phonology, considering the word, preparing serial, short-term memory problems and problem awareness syntax. The characteristics of children with dyslexic in learning disabilities fail to master the skills of reading, writing, spelling or counting. These children do not like reading and refrain from reading in class. In addition, errors during the reading of letters, words or numbers by reading backwards. For example "17" read as "71" and "was" as "saw". These children also have difficulty understanding, remembering and following instructions. Previous studies have been done by (Morgan, Farkas, & Qiong Wu, 2009; Ndombo, 2013; Skiada, Soroniati, Gardeli, & Zissis, 2014).

Autism

Children with autism have problems in socialising and communicating. The National Autism Society of Malaysia (NASOM) lists many characteristics of children with autism. They do not show any reaction. Children with Autism also do not recognize the danger in their daily lives and do not feel pain. Children with Autism also have coarse and uneven fine motor skills. They also cannot accept any new changes immediately. Autism may also have special talents recollecting details in certain areas. Intervention on autism has been reported by (Ahmad, Ismail, Azman, & Dolhalit, 2010; Fatimah, Ahmad, Akhir, & Azmee, 2010; Weng & Bouck, 2014). Previous studies mostly focus on technologies through the use of technology to improve children's achievement.

Attention Deficit Hypertension Disorder (ADHD)

Children with ADHD do not focus or have a short concentration level. However, they are hyper-active and difficult to control. This cause problems during the learning process. Typically, children with ADHD cannot concentrate on learning. They are also weak in mastering the 3M's, i.e. reading writing and arithmetic. ADHD is usually caused by environmental stimuli but is inherent in the child. Term convergence of ADHD children is also short. Therefore, teachers should use t appropriate approaches to create a learning environment that has minimal external interference. (Naglieri, Goldstein, Delauder, & Schwebach, 2005; Taddei, Contena, Caria, Venturini, & Venditti, 2011).

Down Syndrome

Down Syndrome is associated with children who cannot learn as fast as a normal child. They typically cannot store the information. They do not clearly understand and have difficulty using information required in a particular situation. This brain disorder is usually caused by genetic factors during pregnancy, illness or injury during childhood and adolescence. Children with Down Syndrome do not pay attention when there is a teaching and learning process in the classroom, are not ready to learn, do not understand what is learned and are less mature. Their thinking does not commensurate with their age and they cannot remember what is being taught and learned(Agheana& Duță, 2015; Trezise, Gray, Taffe, & Sheppard, 2014; Wan Fatimah Wan Ahmad, Hidayatun Nafisah Isa Muddin, & Afza Shafie, 2014).

3.0 PROBLEM STATEMENT

Specific Learning Disabilities (SpLD) involves the child's intelligence, activity, achievement, past educational experience, age, rate of learning with various instructional approaches, quality of present and past teaching, motivation and many other curriculum and environmental factors. Children with SpLD are bright enough to learn the basic skills and information required. The learning strategies and information processing skills of most individuals with LD are typically expressed, but they are at a much slower pace. (Grant, 2010).

Children with SpLD are the single largest group in the special education group in Malaysia. They have above average intelligence though they have difficulties to focus in academic work. However, these children receive instruction in classroom based on their disabilities. New methods are still considered. Children with SpLD receive new method of instructions., Teacher needs to know which effective methods to overcome their disabilities. difference in disabilitiesbring forth different levels of understanding (Fletcher, 2012). Based on the reports statistics(Ministry of Education, 2013), it show that Children with SpLD are increasing every year.

The increasing number of students with disabilities, needs appropriate instructional materials in mathematics instruction in special education classrooms. Research on major textbook companies providing for students with learning disabilities in mathematics is lacking. Most current education textbooks in the marketplace are strongly language-based. So, we need to develop instructions or strategies to help children with learning disabilities.

4.0 SIGNIFICANT OF THE STUDY

The study is to find an appropriate standards-based mathematics program for students with learning disabilities in mathematics. Many commercially prepared mathematics textbooks were evaluated to determine which program is closely aligned with the special learning needs of students with mathematics learning disabilities. The study focuses students with autism, ADHD, dyslexia and Down Syndrome and other disabilities related to mental health. Scaffolding will help educators, facilitators and curriculum application developers to create appropriate instruments and teaching programs for the benefit of disadvantaged communities in addressing problems in self-esteem. Students with learning disabilities receiving 80% or more of their instruction, including mathematics, in the general education classroom continues to increase using scaffolding as reported by Garderen et al., (2012).

5.0 SCOPE AND LIMITATON

In order to support the objectives of this study, an investigation limited to children with autism, ADHD, dyslexia and Down Syndrome is done. Research focuses on basic numeracy skills in visual dynamics with embedded devices that are essentially the domain of value towards revolutionary handheld technology innovation as well as the manipulative strategies using Lego as example. By studying at the difference in disabilities, we can compare which method is best suited for children with disabilities in learning. The different disabilities and the behaviour of the child will usually differ in learning styles (Fletcher, 2012).

6.0 THEORETICAL OF FRAMEWORK

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Model Of Teaching

Scaffolding

Scaffolding is defined as a framework provided to children to solve problems. Scaffolding is also the assistance given by the teacher to the student so that the student can complete the task which cannot be solved by the child. According to Wood, Bruner and Ross (1976), scaffolding has been used by teachers for the purpose of facilitating the teaching and learning process. Scaffolding. It is also used as a tool to help students learn new skills. The development will be stunted or slow down students if students receive less scaffolding. But if teachers give excessive scaffolding to students, these students also failed to grow and are unable to perform their duties alone. scaffolding have been identified to help children. These include clear objectives, giving instructions exactly, referring to the concrete or actual situations, provide efficiency in services and remove the sense of uncertainty and frustration. There are various types of scaffolding that can be practiced in any model, suchas, explaining, asking questions, and adaptation of instructional materials available to help and guide children with SpLD.

This study highlights scaffolding because study involves interventions through the use of computers as well as materials such as Lego, paper and related materials. The principles of scaffolding is a technique in which teachers are required to focus on SpLD to be responsible gradually. The Knowledge of students is the result of activities performed rather than through passive teaching. This principle emphasizes the actions and thoughts of the students and not the teachers. Scaffolding studies have been done by (Deaño, Alfonso, & Das, 2015; Tsai, Hou, Lai, Liu, & Yang, 2012; Waiyakoon, Khlaisang, & Koraneekij, 2015).

Effective Instruction / Strategies

Research in the field of education have identified many instructional strategies that design to improve student achievement. Effective instructional strategies can utilize in many type. Such as technology. But not all technology is appropriate for them to improve their achievement. Manipulative instruction also can help student to improve their achievement based on their problem in learning.

Technology Assisted Instruction (TAI)

Technology has became an important part of instruction in public school and private schools. The are many variables to consider when using technology in education. Studies regarding the use of technology as instruction have been conducted by (Batorowicz, Missiuna, & Pollock, 2012; Edward & Diana, 2010; Lin, Lin, Jen, Wang, & Chang, 2011; Poobrasert & Gestubtim, 2013). The use of technology can help students to to achieve more in the learning process. Technology also benefits student with learning disabilities as well as for normal students. (Shifrer & Callahan, 2010)

Manipulative Instruction

Learning mathematics in primary education is mostly through observation interaction with external information such as real objects, manipulation, physical, and through representation. Researchers have noted the importance of teaching materials to the needs of students with disabilities, such as icons based on pictures or symbolic representations and using concrete visual representations which facilitate students' understanding of mathematical problems (Mazzocco, Myers, Lewis, Hanich, & Murphy, 2013; Nuray Can Calik & Tevhide Kargin, 2010; Satsangi & Bouck, 2015).

Theories Influencing Instructional Strategies

Theories help teachers in teaching to enhance students' abilities in both academically and socially. Learning theories refer to the principles and laws of learning derived from studies conducted by educational psychologists. The teacher will understand different learning styles of students, thus correlating with the legal principles and the methods and techniques of teaching for effective learning objectives. The theory of learning is not only for normal children. It is also very useful for children with learning difficulties. A learning disability is a general term that refers to a cluster of various disorders that are manifested by difficulty or inability to master the skills of listening, speaking, reading, writing, reasoning and math skills. Theories associated with learning difficulties provide diversity in teaching techniques that can be used to teach children with learning disabilities.

Constructivism

Table 1 shows the theory of learning related in this study. Constructivism theory considers that science exist outside the mind, but the mind is bult based on real experience.. This theory is built from a combination of studies done by psychologists, philosopher and researchers.

Theory	Explanation
Piaget	The learning process consists of schema, assimilation, accommodation, and equilibration.
Lev Vygotsky	Language is the most important symbol system to support cognitive development of children. Scaffolding is a framework that supports individual learning process. Zone of proximal development of children's cognitive development can be enhanced and strengthened through their interactions with individuals who are capable

Table 1 Theory of learning related

Socio-cognitive

Socio-cognitive and socio-motivational theories have become increasingly important for analysing how social constraints influence cognitive processes through multimedia learning. Socio-cognitive approach in dealing with human personality different from the psychodynamic approach and theory trait by two significant aspects. First, Socio-cognitive like Bandura and Rotter Maschel, studied y the thoughts and emotions of the human conscious level and the factors that drive their behaviour. Second, Socio-cognitive approach does not use clinical cases to understand the people, but the rules are closely related to operant conditioning. Socio-cognitive approach recognizes the importance of maintaining behavioural reinforcement (Berntien, Penner, Clarke Steward & Roy, 2008). In personality Socio-cognitive theory Bandura (1986) pointed out social factors, cognitive and behaviour play an important role in the learning process. Model Reciprocal Determinism with three main factors, namely behaviour, individual and environment interact to affect learning.

Based on this model, the study examines how each factor plays an important role in the learning process. Table 2 shows the model reciprocal determinism and the description of each factor to ensure a smooth learning process. Figure 2 shows theoretical framework Mathematics Intervention and the relationship among the factors for this study

Table 2 Model reciprocal determinism

Factor	Explanation
Individual	In terms of age, gender, type of disability, learning problem
Behavior	Students who have disability such as ADHD, Autism, Dyslexia and
	Down Syndrome have different characteristics. With different
	characteristics, methods of reinforcement are also different. Learning
	process will vary according to the characteristics of children.
Environmental	Classroom environment, the tools used during learning, teachers'
	skills, parents and expertise of teachers



Figure 2 Theoretical framework mathematics intervention

7.0 METHODOLOGY

Theoretical Study

In the process of developing a research goal, a preliminary study was carried out. Preliminary studies included interviews and observations by teachers, parents and children with disability. The analysis of this study supports the formulation of the problem and the main purpose of this study. An understanding of devices based on visual dynamic in the calculation of basic skills for children with disability such as autism, ADHD, Dyslexia and Down Syndrome were carried during in this phase. The study also looked at the integration of visual computing as part of the treatment to improve the lives of individuals affected by disabilities, and to troubled children in learning.

Expert Consultation

Consultation was conducted to provide empirical evidence of the special education teachers and instructors. The main purpose of this activity is to identify the components, issues and phases and steps involved in visual computing skills treatment for autism, ADHD, dyslexia and Down Syndrome

Model Design

The conceptual model has been designed as a medium to verify and assess the effectiveness of the proposed design for the basic calculation skills to children with autism, ADHD, dyslexia and Down Syndrome. Development using dynamic element based on visual technology as well as modern basic and manipulative elements using concrete materials, such as Lego. This prototype was used as a therapeutic tool in mental illness among children, especially children with autism, ADHD, dyslexia and Down Syndrome.

Experimental Study

Experimental studies were conducted on the actual project to measure the practical aspects, to help validate the design model of the proposed guidelines. Questionnaire were used in this study as a means to get feedback from a variety of respondents, including parents, family members, teachers and experts. Before the experiment, pre and post-tests were given to gauge the level of achievement of children in these interventions. Figure 3 shows the research design in this study.



Figure 3 Research Design

8.0 CONCLUSION

Assessment or intervention on children with SpLD has been expanded to include information from a wide variety of procedures. Children and parents were contributors of valuable information reflecting a comprehensive repertoire of the child, thus paving the way for a more meaningful study to enhance the social-emotional and behavioural domains of children with LD. In conclusion, intervention for children with SpLD is a challenge for teachers and parents. Children with SpLD require special instructions in order to succeed. The study focused on a variety of interventions in an attempt to find the best way toinstruct children with SpLD. Comparing which intervention method was suitable for each type category disability, may help teacher choose the right instructions in the learning process and also in conclusion may help children acquire the essential skills they will need for future independence

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