

Facilitating Student with Down Syndrome to Recognized Shapes Using Concrete-Representation-Abstract (CRA) Approach

Nurul Syuhada Binti Kharit

Abstract—This action research was conducted in a class of Special Education Programs with learning disabilities, located in Kuching, Sarawak Malaysia, to help a Down Syndrome (DS) student to recognize the basic shapes using Concrete-Representation-Abstract (CRA) approach. Data for this research was collected through observation, analysis documents and interviews. Data from observation, document analysis and interviews were analyzed qualitatively. The results of the observation were conducted quantitatively in terms of percentages and graphs. Revision of the data was generated using the data triangulation method. Kurt Lewin model has been used in this study to implement the stages of the research such as planning, action, observing and reflection to achieve the intended objectives. The findings showed that a student with Down Syndrome was able to recognize the shapes and complete the tasks involving different shapes. In addition, the CRA approach has been able to improve my teaching and learning practices. The use of CRA is expected to be applied to students who have other problems and can be used for subjects other than mathematics.

Keywords—CRA approach, Down Syndrome, shapes, special education

I. INTRODUCTION

I have done three practicum at three different schools around Kuching and other districts. My first practical training was at the Sekolah Kebangsaan Suria My second practicum was at the Sekolah Kebangsaan Salju, and my third practicum was at the Sekolah Kebangsaan Sinar. I gained some experiences from these practical exercises as a teacher and applied teaching practices in the class. Therefore, after these three phases of the practicum, I have found that students with Down syndrome have an attraction that draws me to help them so make them as research subjects. However, I have chosen the new students enrolled in the school during the third practicum.

During the third practical training of at SK Sinar, I found that a student with Down syndrome need to be assist. Therefore, the focus of my research is to help Jerry, a DS student to get to know the shape of a circular, triangular and rectangular. In addition, I have identified that Jerry did not know the form of round, triangular and rectangular through the worksheet that had been done. I have directed the pupil to

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color the shape on paper provided by showing the examples to the pupil. However, the pupil had colored the triangular shape. Here, I found that Jerry could not distinguish a round shape with triangles. In addition, I had also ordered Jerry to take a rectangular object such as an eraser but Jerry took a ball. Fig. 1 represents through the observation, I found that Jerry could not distinguish the shapes of the objects.



Jerry could not colour the shape design which was directed by the teacher

Fig. 1 Shapes colored by DS student

A. Objectives

1. To increase the ability of DS student to recognize the shapes through CRA approach.
2. To determine the CRA approach can improve the process of teaching and learning conducted by the teacher.

B. Research questions

1. How to use the CRA approach in teaching mathematics lesson that can help the DS student syndrome to recognize the round, triangular and rectangular shapes.
2. How to use the CRA approach to enhance the teacher teaching practices in helping the DS student to recognize shapes.

II. LITERATURE REVIEW

CRA approach is a method of effective intervention for mathematics instruction that can enhance the performance of mathematics for student with learning disabilities through a sequence of concrete-representation-abstract instruction. Fig. 2 represents CRA command structure consists of three levels, namely, the concrete, the level of representation and abstraction. CRA has three parts strategy which command each part has a previous instruction to enhance student of learning disabilities understanding their learning.

Hana has 4 marbles. She gave two marbles to Cris. How many marbles left?

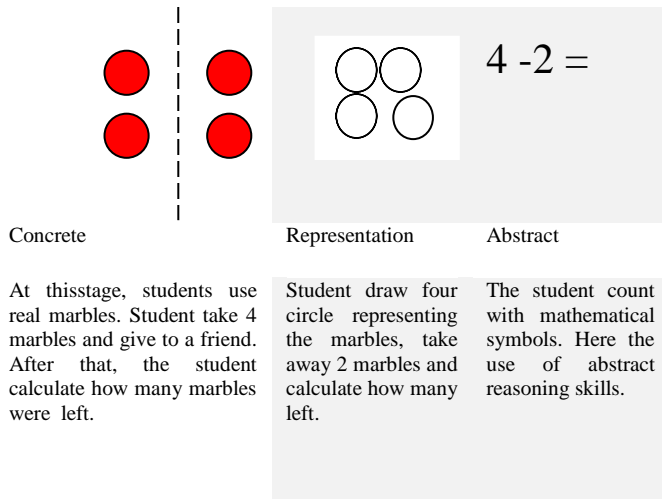


Fig. 2 Examples of the Application of the Concrete-Representatives-Abstract approach

Down Syndrome or Trisomy 21 is a genetic condition in which there is excessive expansion of child exploitation leads to stunted physical and mental health [1]. DS child exploitation has variation in mental abilities, behavior and growth stages. The level of their intellectual ability was ranging from mild to moderate.

A. Shapes

According to [15], shape is one of the seven elements of art. Shapes in terms of art are an enclosed space defined by other elements. Shapes with two dimensional are limited only to length and width. Geometric are round, triangular, square and others shapes. According to [6], children often draw irregular shapes when imitating the round, square, and triangle shapes. Children can identify the shapes by visual observation

B. Related theory

Bruner proposes that in the learning process should have two things that optimal experience to be able and want to learn and encouraging knowledge to understanding optimum [12]. Table 1 showed the three steps that need to be applied in the theory of inactive, iconic and symbolic phase.

TABLE I
BRUNER THEORY AND CRA APPROACH

Bruner cognitive theory	Level	CRA approach
Students need concrete objects to gain actual experience	Enactive-concrete	Use concrete materials to give a true picture to student
Students can describe something with a group of images that represent the concepts.	Iconic-representation	Students use pictures to solve problems.
Students can make a picture (mental image)	Symbolic-abstract	Students to solve problems through mathematical symbols.

C. Previous studies

According to [13], CRA is a good approach to teach the students with learning difficulties moreover having trouble in

understanding the concepts, operations and applications. According to [10], the problem solving can be solved with a suitable diagram to help the students use the concrete representations using diagrams to develop an understanding at the level of the concrete to the abstract. Reference [5] found that CRA techniques helped the students to master the operation of division basic facts. According to [14], primary school students more easily comprehend a mathematical concept through the use of concrete objects and drawings.

Based on the study by [4], the teacher should be a good one in terms of delivering instruction and the model is widely used, drawings and representative which students can develop further and be able to relate the understanding of mathematical concepts. Reference [7] stated that manipulative can help students to build a meaningful career and should be used before formal instruction symbolically.

Reference [9], noted the purpose of using manipulative in mathematics is to help the students to understand abstract concepts. The successful using of manipulative is when students can think symbolically such as implying a block without any problems [8]. The best way to teach special education students is to use concrete objects. Reference [2] stated the students using concrete objects have comprehensive mental representations, express more motivation, understanding of mathematical ideas and easier to apply in situations of life.

D. Action planning

The Kurt Lewin model of action research was chosen as a model of my action research. He said an investigation should be followed by social action. Fig. 3 represents the model with each cycle includes planning the steps in implementing an action research process or the result of an action.

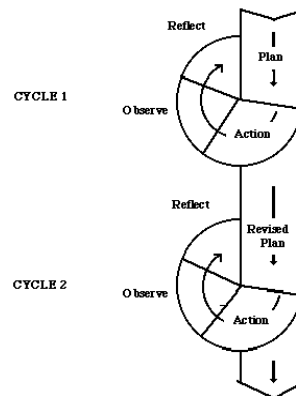


Fig. 3 Kurt Lewin action research model

III. METHODOLOGY

A. Research participant

My research participant for this action research was a down syndrome student named Jerry aged 7 years old in a special education classroom. Academically through the observation and analysis of documents, Jerry has not mastered any skills such as reading, writing, and counting. Jerry is still not able to complete tasks related to the concepts of Mathematics

B. Method of data collection

Observation

I have done the observation for seven weeks execution of my actions using CRA approach. I have been using checklists and field notes for observational data.

Interview

I also used the interview as a data collection tool in my action research. Through the interview, I can explore and get in-depth research information to get the results. Through interviews also a lot of information can be obtained even if there is a few respondents.

Document analysis

The document work of students that need to be analyzed before and after the intervention conducted and video recording were carried out during the intervention.

IV. FINDINGS

How far is the CRA approach helping the DS student to recognize the shapes? The results showed that Jerry already recognize the shapes and able to perform tasks related to the shapes but Jerry was able to capture only the concrete stage. Although at this level, Jerry only recognize the concrete concepts, he also showed a positive improvement in learning to recognize the shapes.

Observation (Checklist)

Fig. 4, Fig. 5 and Fig. 6 represent the observation through the checklist and the implementation of intervention to help DS students recognize shapes through CRA approach was analyzed.

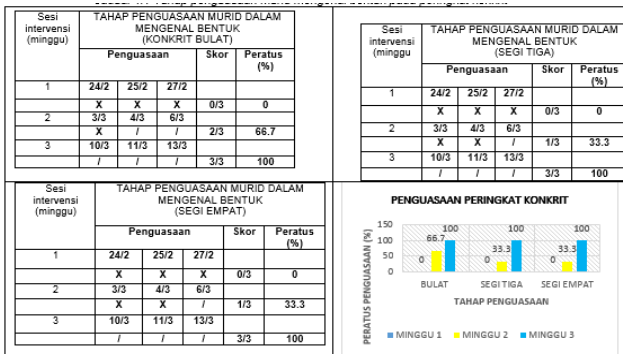


Fig. 4 Level of performance using concrete

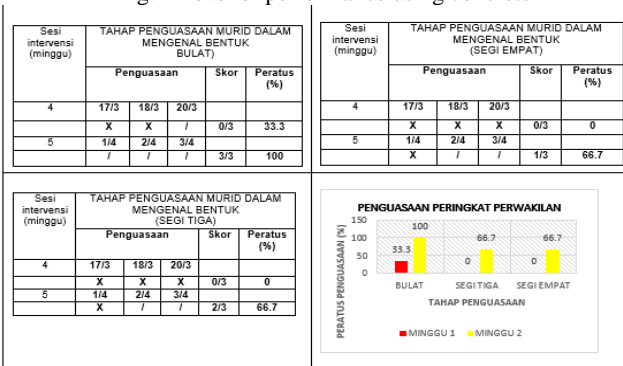


Fig. 5 Level of performance using representation

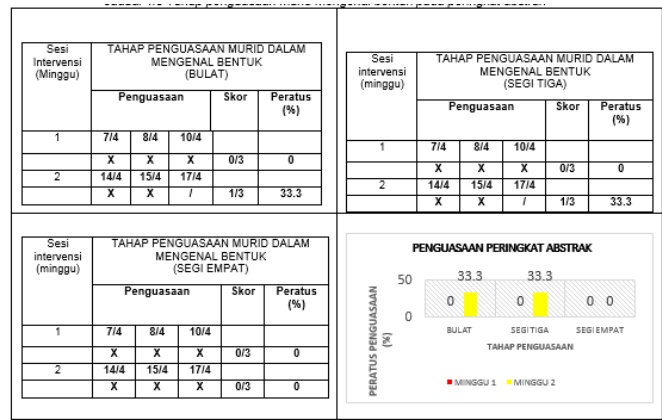


Fig. 6 Level of performance using abstract

Document analysis

Fig. 7 represents the document analysis revealed that Jerry was able to recognize shapes and can solve every direction from teachers.

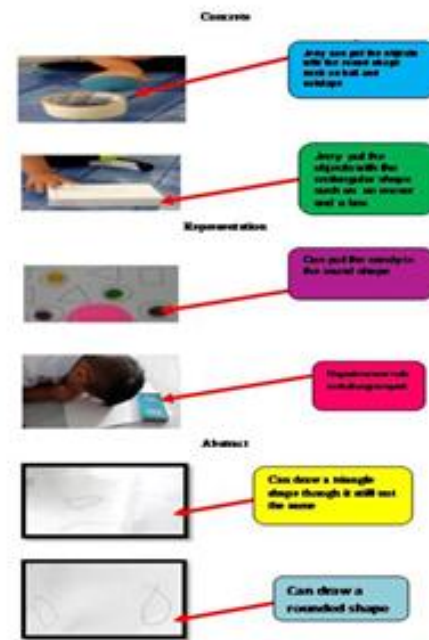


Fig. 7 Document analysis

How could CRA Approach improve my teaching practices in helping DS student to recognize shapes? Through this action research, I tried to equip myself with the good values of teaching that should be in every one of us as teachers. This action research also enabled me to improve my practices using different approaches in my teaching. Furthermore, the CRA approach is able to facilitate DS student learning who has a lower level of intellectual than the normal student. CRA approach could improve my quality of teaching as well as to enhance my knowledge of how the CRA approach can be implemented in other subjects. In addition, the CRA approach could helped me to build a good relationship between the students and the teachers.

V. DISCUSSION

This action research makes me more aware of the problems faced by the students. Problem solving is the ultimate goal in a process of achieving successful program [3]. However the goal toward solving the problem is not easy because it involves the stages and the use of specific skills [11].

Some of the proposed action for the next cycle from the research that I have conducted are extending this study to the students with the same category to master each level skill well before proceed to the next stage of the intervention. Teachers need to be wise at using a variety of materials that can help students to master the skills. The teacher should be patient to educate the special student because their behaviors are different from normal student. In addition, the CRA can be used in mathematics for addition and subtraction operations. Using CRA approach also can help the students to visualize what are in their minds. For the typical student, imagination skills are more limited because of disturbance in their brains. CRA approach provides an opportunity for students to explore further knowledge and most appropriate practice to students with learning disabilities.

REFERENCES

- [1] About Down Syndrome, http://kidshealth.org/parent/medical/genetic/down_syndrome.html diakses pada 20 Ogos 2014
- [2] Anstrom, T., *Supporting Students in Mathematics Through the Use of Manipulatives*. Retrieved from Center of Implementing Technology in Education, <http://www.cited.org/library/resourcedocs/Supporting%20Students%20in%20Mathematics%20Through%20the%20Use%20of%20Manipulatives.pdf>, 2006.
- [3] Azizi Yahya, *Penyelesaian Masalah*, <http://eprints.utm.my/10355/3/bab8.pdf> diakses pada 25 September 2014, 2010.
- [4] Catherine A. Kelly, Using Manipulatives in Mathematical Problem Solving : A Performance Based Analysis, *The Montana Mathematics Enthusiast*, ISSN 1551-3440, Vol. 3, no.2, pp. 184-193 diakses pada 20 September 2014 http://www.math.umt.edu/tmme/vol3no2/tmmevol3no2_colorado_pp184_193.pdf, 2006.
- [5] Christina Lau Yuan Yuan, Penggunaan Teknik CRA Untuk Membantu Dua Orang Murid Tahun Lima Menguasai Pembahagian Fakta Asas, *Seminar Penyelidikan Tindakan IPGKBL 2011* diakses pada 15 Jun 2014 <http://www.ipbl.edu.my/portal/penyelidikan/BukuKoleksi/Buku%20Koleksi%20PT%20MT%202011.pdf>, 2011.
- [6] Clements, Douglas., and Michael T. Battista, *The Development of a Logo-Based Elementary School Geometry Curriculum*. Buffalo, N.Y/ Kent, Ohio: State University of New York at Buffalo /Kent State University, 1992.
- [7] Douglas H. Clements, 'Concrete' Manipulatives, *Concrete Ideas, Contemporary Issues in Early Childhood*, 1(1), 45-60. Diakses pada 24 September 2014 <http://dx.doi.org/10.2304/ciec.2000.1.1.7>, 2000.
- [8] Joseph M. Furner, Noorchaya Yahya & Mary Lou Duffy, Teach Mathematics: Strategies to Reach All Students, *Intervention In School And Clinic* Vol. 41, No. 1, September 2005 (Pp. 16-23) diakses pada 20 September 2014 <http://mdestream.mde.k12.ms.us/sped/ToolKit/Articles/Differentiation/Furner.pdf>, 2005.
- [9] Kosko, K. W., & Wilkins, J. L. M., Mathematical Communication and Its Relation to the Frequency of Manipulative Use, *International Electronic Journal of Mathematics Education* Vol.5, No.2 diakses pada 21 September 2014 di laman web <http://www.iejme.com/022010/d3.pdf>, 2010.
- [10] Lai Kim Leong, *Penyelesaian Masalah Matematik Sekolah Rendah dengan Menggunakan Strategi Melukis Gambar Rajah* diakses pada 21 September 2014 <http://www.ipbl.edu.my/portal/penyelidikan/seminar/papers/2007/bengkel/laibengkelIPBLfp.pdf>, 2007.
- [11] Noriah Mohamad & Azlinda Azman, *Proses Penyelesaian Masalah* diakses pada 25 September 2014 [http://Web.Usm.My/Mentor/Download/PROGRAM_MENTOR_MENTEE_PROSES_PENYELESAIAN_MASALAH_\(Noriah_Mohamad_&_Azlinda_Azman\).pdf](http://Web.Usm.My/Mentor/Download/PROGRAM_MENTOR_MENTEE_PROSES_PENYELESAIAN_MASALAH_(Noriah_Mohamad_&_Azlinda_Azman).pdf)
- [12] Nuryadi *Aplikasi Teori Bruner Dalam Pembelajaran Matematika Di Tingkat sd* diakses pada 21 September 2014 <http://made82math.files.wordpress.com/2013/10/aplikasi-teori-bruner-dalam-pembelajaran-matematika-di-tingkatsd.pdf>, 2013.
- [13] Poon Cheng Yong ,Yeo Kee Jar & Noor Azlan, *Mathematics Remedials for Indigenous Pupils with Learning Disabilities* diakses pada 23 April 2014 [http://journalarticle.ukm.my/6128/1/Akademika_82\(2\)Chap_13-locked.pdf](http://journalarticle.ukm.my/6128/1/Akademika_82(2)Chap_13-locked.pdf), 2012.
- [14] Samsudin Drahman & Fatimah Salleh, *Visualisasi dalam Penyelesaian Masalah Matematik Berayat* diakses pada 25 September 2014 http://apjee.usm.my/JPP_19_2004/Jilid%2019%20Artikel%2004.pdf, 2004.
- [15] Shelley Esaak, *What is the Definition of Shape in Art* diakses pada 21 September 2014 <http://arthistory.about.com/cs/glossaries/g/sshape.htm>, 2014.

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