



**RESEARCH ARTICLE**

**The Study of Development an Innovative Raised Line Drawing Kit for Students with Visual Impairment**

**Kanvipa Hong-ngam**

Suan Dusit University, Thailand

Email: [kunvipah@gmail.com](mailto:kunvipah@gmail.com)

Received: 31<sup>st</sup> March 2016, Revised: 24<sup>th</sup> April 2016, Accepted: 30<sup>th</sup> April 2016

**ABSTRACT**

*The study of development an innovative raised line drawing kit for students with visual impairment aimed to develop an innovative raised line drawing kit for students with visual impairment, an efficiency on using raised line drawing kit for students with visual impairment and study satisfaction of students with visual impairment in using raised line drawing kit to generating tactile graphic. The quasi-Experimental Design; one group post-test Design was use in data collection. Participants of the study were 10 students with visual impairment who study in grade 6 and 1 sighted teacher of Bangkok school for the blind, participants were selected by purposive sampling method. A set of raised line drawing kit consist of 4 items: 1) rubber sheet 2) clip board 3) clear thin plastic sheet and 4) ball point pen. The author found that rubber sheet which made from latex still remain adverse smell of latex. Consequently, another type of rubber sheet was reproduced from polymer. Two type of Rubber sheet was applied to raised line drawing kit and its where try out by others students with visual impairment for preliminary study. We found that both latex rubber sheet and polymer rubber sheet have similar property in generating raised line of tactile graphic, The result of developmental test during producing process also indicated that both type of rubber sheet have similar properties. For another items such as clip board, clear thin plastic sheet and inkless ball point pen size 0.5 mm. are marketable. Both type of innovative raised line drawing kit was apply as learning materials in 11 geometry lessons, one lesson was divided into 2 periods and one period for 60 minutes. The efficiency test E1/E2 was used to indicate an efficiency of using innovative raised line drawing kit as a learning materials,  $E1/E2 = 70/70$  was set for a criteria of efficiency value. Result of the study shown that means of efficiency of process and means of efficiency of outcome of the students higher than 70/70. The satisfaction of using both type of raised line drawing kits was high, the latex type raised line drawing kit  $M = 3.73$  and polymer type raised line drawing kit  $M = 3.99$ . Polymer type raised line drawing kit have vivid color that easy detectable by student who have low vision. Moreover, both type of rubber sheets are smoothly drawing in generating tactile graphic. The natural latex type of raised line drawing kit is needed to improve some more property, in the same time, the raised line drawing kit production should be included in the policy on developing quality of teaching students with visual impairment.*

**Key words:** Raised line drawing kit, tactile graphic, student with visual impairment

©All Rights Reserved 'Council of Research & Sustainable Development', India

**OBJECTIVE**

1. To develop innovative painting a series of relief for students with visual impairments .
2. To Operating Results Alleviate the raised line drawing kit for students with visual impairments.
3. The satisfaction of students with visual impairments. Relief to the drawing board.

**SAMPLE**

Students who are visually impaired between Pratom 6 at Bangkok School for the Blind and Teachers of 10 people, including one teacher is total of 11 people selected Purposive Sampling, and the researchers used experimental design One group Post-test Design.

**RESULT**

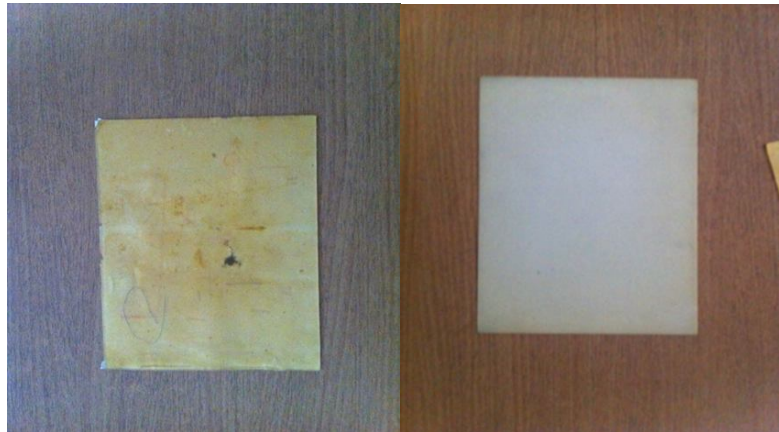
**1. Development of an Innovative Raised Line Drawing Kit:**

The development of this raised line drawing kit, start by researching the sources of both primary and secondary sources as well. We inquiries from the specialist of children with visual impairments

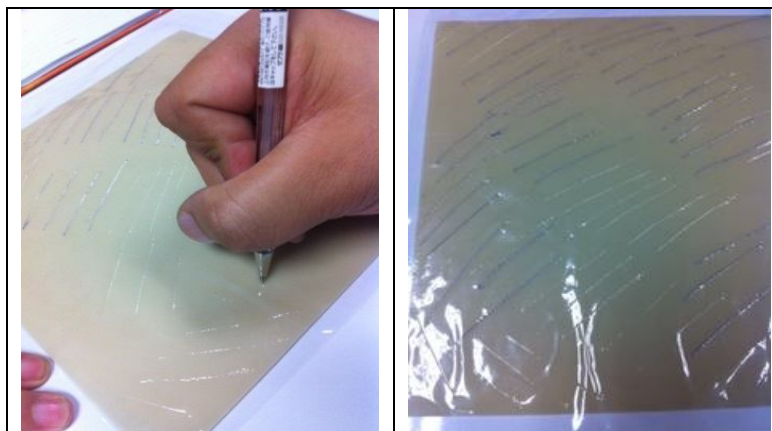
and visually, then Impaired Those related to the facilities and services related documents such as books , articles and research results both inside and outside the country.

So, experts were currently developing the raised line drawing kit relief that in Japan to use in Thailand. The researchers analyzed the composition of the relief device assembly raised line drawing kit, find out what is required and must be produced. The tires used for secondary authors to achieve relief and started manufacturing rubber prototypes. Which material is made of rubber and polymers.

**Fig. 1:** Shown Raised Line Drawing Kit Produced From Rubber and Polymers



**Fig. 2:** Test Rubbers



## 2. Analysis of the Performance of Embossed Raised Line Drawing Kit:

From analyzing the performance of embossed raised line drawing kit, the formula for calculating performance to ensure the quality of teaching innovation is to find innovative teaching performance criteria E1 / E2 set.

The efficiency of this method is based on that concept of if innovation is performing the actual teaching. When the students carry on through steps, then every step of raised line drawing kit, the average percentage of the learning process of the students in both groups are similar to the average percentage of the posttest.

This evaluate, there should not vary by more than 5 percent by the efficiency of the process E1 represents the average score per cent from the test in subtests and activities during the lesson. E2 represent the performance of the output means the average percent from the tests were conducted after learning. The percent of average scores during of all the activities in classes are similar with Post-test points of all the activities from the class.

Overall, it's holding the variance during 2.5 to 5% of the performance test results. Raised line drawing kit made of rubber and polymers with higher performance threshold. The performance of

the raised line drawing kit made of embossed polymer is better than the efficiency of the board is made of rubber.

**Fig. 3:** Performance Testing of Rubber



### 3. Analysis of Satisfaction Using a Raised Line Drawing Kit:

Form the survey of satisfaction with the use of a raised line drawing kit relief of the students, 10 teachers and one person was found that overall opinion on a set drawing board reliefs made of rubber sheet and made of rubber polymer does not very different from each other. The satisfactions of students and teachers who use this raised line drawing kit both rubber and polymers are do a good well done.

### SUMMARY AND DISCUSSION

Innovative of raised line drawing kit by rubber sheet Produced half the size of A4 sheet is prepared to have a template called mole with compressed air and drying it in time and temperature. But with limits of innovation, such as time, budget expenditures in laboratory instruments. In laboratory experiments, the rubber sheet mold prototyping tools to create an A4-sized specifically in laboratory only.

Therefore we want to achieve a possible approach to be taken and to expand in the future. The experiment produced using existing tools in the laboratory to tires are made of rubber and can be used as similar to the original rubber. Through the production process and improved several times, finally it can be applied to the experimental group. It also does not resolve the mold problem permanently, such as type of Heveabrasiliensis (the genus *Penicillium* and *Aspergillus*) Also, the specific characteristic smell is quite strong for user, it's may lead to interruptions in breathing.

Production of rubber made from polymers. The polymer sheets of A4 as a laboratory tool for the production of rubber polymers by casting a new model which is it took a long time and the production is complete. Thus, the production of polymer sheets has tools for drying compressed air and which is used to produce rubber made of polymer in fit of size A4.

Some clear plastic can be used for writing. Such as some clear plastic wrap for wrap material that can be used as well. When writing, the embossed pen down some transparencies with both types of rubber and polymer pad.

Board under rubber sheet is needed. The researcher applied board for both type. By using a plastic sheet with a top clamps, this board are sold in generally stationery store.

Researchers have been searching for a pen that can be used with raised line drawing kit ad rubber sheet. Found that the pen is out of ink, the head size .05 can be used very well. This pen is normally sale in the stationery store.

From the performance of the method, the researchers found that the production of raised line drawing kit. They had two types of rubber sheets, first is rubber and second is rubber polymers.

Production from rubber sheet is smaller than a sheet of polymer and a slightly inferior quality than rubber polymers.

Therefore, both rubber and polymers sheet are higher overall of efficiency criteria.

The user provides feedback on the use of rubber sheet were found when drawing on raised line drawing kit reliefs made of rubber. When dragged pen on rubber sheet, the line is uncertain and feel not smooth and hold to drag out the tire tracks with a groove. Also, rubber sheets is too Small size, it's should be A4 .

The color of the rubber sheet is unclear, which mean the user counsel for rubber with soft colors like light blue, pink, white, which is not dark color. Thus, user concerned with the smell of rubber sheet. They want to smell like the scent smells, such as strawberry. However, the user like Rubber sheet than plastic than polymer because of its hold with plastic sheet better than rubber sheet.

The user raised line drawing kit and rubber sheet made of polymer suggestion that the rubber polymer odorless, but the polymer does not adhere to the plastic sheet

The user recommendations to the embossed plastic sheets that is too thin, plastic sheets are easily broken, wrinkled and requires at least three times per sheet.

For sheet rubber board wanted a clip board to be dominant. Because of the clip on the right should not be able to lift and hold, the paper would have to use both hands to open the clip board. When used with a set of geometry by pin plastic flow, it's making difficult and take time for hold the plastic.

Other suggestions found that, users prefer to use both rubber sheet raised line drawing kit. Big point is when writing does not need much exertion to press. Raised line drawing kit is better equipment than normally used, it's save time and work faster and, also can be applied to other subjects such as arts or geography. Suggested selling price for 500-800 baht rubber sheets and rubber polymers should sell for 700-900 baht

## SUGGESTIONS

### Research Results to Use:

1. Should the results of this research is to produce innovative, raised line drawing kit for visually impaired people can use it.
2. The results of this research can be applied to Visual people.
3. The government should be set policy and supporting to make raised line drawing kit to the students who are visually impaired across the country.

### Suggestions for Develop this Next Research:

There're should have done the research further research using materials from the timber and odor problems.

1. There're should satisfaction research with sample of students who are visually impaired every part of Thailand.
2. There're should prepare the budget for aseptically to preparation, and production raised line drawing kit for extension to the next visually target.

## REFERENCES

1. Amedeo D'Angiulli (2007): Raised-Line Pictures, Blindness, and Tactile "Beliefs": An Observational Case Study Print edition.
2. Chatmanop Gold (1992): Horizontal develop special courses for children body. Since the brain and intellectual disabilities in the age of 0-7 years. Edition 1. Bangkok. Ministry of Education Foundation for the Blind Under the Royal Patronage.
3. Chatmanop Gold (1999): Smile. M.p.t. Geometry. Thesis Master of Education. Technology Education Maha Sarakham University.
4. Chatmanop Gold (2012): Article The development of educational innovation. M.p.t.
5. Department of General Education Ministry of Education.
6. Gil Da Nan lift Gold (1997): The technology, education and innovation. Bangkok: Chulalongkorn University.
7. Grundy S. and Kemmis S. (1982): Educational action research in Australia: In S. Kemmis(ed) The Action Research Reader. Victoria: Deakin Universit.
8. Heller M.A. (1989): Picture and pattern perception in the sighted and the blind: The advantage of the late blind. Perception, 18, 379-389.

9. Henry C. and Mc Taggart R. (1997): EAE 717 Action Research and Critical Social Science. EAE 430/632, Unit Guide, The Faculty of Education, Victoria: Deakin University.
10. Hurley Robert F. and Hult Tomas M. (1998): Innovation, market orientation, and organizational learning: an integration and empirical examination. *Journal of Marketing*.
11. Interdisciplinary Graduate Program Kasetsart University Sandrine Russier (1999): Haptic Discrimination of Two-Dimensional Raised-Line Shapes by Blind and Sighted Adults.
12. Krishna Valley consumption and colleagues (2014): Learning aids for the visually impaired massage Thailand. Research. Computer Technology Science and Technology University of Technology Rajamangala, Pathum Thani.
13. Magnan A., Aimar J.-B. and Baldy R. (2000): Representation et execution d'un dessin-modèle compose de figures geometriques elementaires chez l'enfant de cinq à huitans: Effet de la tâche et de l'ordre de presentation des figures elementaires. [Representation and execution of a drawing composed of elementary geometric shapes in 5- to 8-year-old children: Effect of task and order of presentation of the elementary shapes.] *Archives de Psychologie*.
14. Magnan A., Baldy R. and Chatillon J-F. (1999): Organizing principle in 4- to 8-year-old children's drawings of embedded geometric shapes.
15. Scan delight in the Federation. (1997): The study of information and communications technology demand patterns. To access the information of the Visually Impaired. Dissertation Master of Arts ( Social Development ), Bachelor of Social Development.
16. Serge Bouaziz, Sandrine Russier, and Annie Magnan (2005): The Copying of Complex Geometric Drawings by Sighted and Visually Impaired Children.
17. Sri minute rush by the Council. (1999): Study of the picture book readings for the blind.
18. Swiss Review of Psychology, Quinn, J.B. (2000): Outsourcing innovation: the new engine of growth. *MIT Sloan Management Review*.
19. Trott P. (2002): *Innovation Management and New Product Development*. 2nded. Singapore Prentice-Hall.
20. Van de Ven, A.H. (1986): General problems in the management of innovation. *Management Science*.
21. Vithit Supsakorn (1996): The problems and solutions regarding the production and use of media, teaching in a school for the blind, Thesis Master of Chulalongkorn University.

**How to cite this article:**

Hong-nagam K. (2016): The Study of Development an Innovative Raised Line Drawing Kit for Students with Visual Impairment. *Annals of Education*, Vol. 2[4]: Dec., 2016: 1-5.