



**TOOLS FOR IDEAS: MAKING CONCEPTUAL
INFORMATION MORE TANGIBLE**

BY

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วิทยานิพนธ์ฉบับนี้สำเร็จได้เป็นอย่างดีเนื่องมาจากได้รับความอนุเคราะห์จาก อาจารย์ David Schafer อาจารย์ Sridhar Ryalie และอาจารย์ ชีรนพ หวังศิลปคุณ ที่ให้ความสนใจใส่ช่วยเหลือ และคอยให้คำปรึกษาแนะนำเป็นอย่างดีมาโดยตลอด

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Abstract

Human produce gestures while they are talking or explaining something. Hands play a significant role in learning and cognition. According to a number of research papers, hands connect to the brain and enhance thinking ability. The purpose of this research was to develop a tactile toolkit through a combination of the concept of “thinking with hands” and creative brainstorming used to make conceptual information more tangible. The toolkit came in a box set with various materials. Each material with its unique characteristics could represent different situations, meanings, and thoughts, allowing users of the toolkit to relate their brains to their hand gestures in their verbal communication.

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บทคัดย่อ

ท่าทางการเคลื่อนไหวมือของมนุษย์ในขณะที่พวกเขากำลังพูดคุย หรืออธิบายสิ่งใด มีบทบาทสำคัญในการเรียนรู้ การทำความเข้าใจ จากงานวิจัยหลายฉบับกล่าวว่าท่าทางของมือสามารถเชื่อมต่อกับสมอง และเสริมสร้างความคิดของมนุษย์ การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อนำความสำคัญของการคิดผ่านการกระบวนการทำงานที่ใช้มือเป็นส่วนร่วม มุ่งเน้นการผลิตความคิดร่วมกันเป็นกลุ่ม

ผู้เขียนได้ออกแบบชุดเครื่องมือนำเสนอความคิดประกอบด้วยวัสดุหลากหลายชนิด ซึ่งผู้ใช้งานสามารถนำเสนอความคิดผ่านการใช้อีกัลกฤษณ์ และรูปทรง ของแต่ละวัสดุแสดงถึงความหมาย และความคิดเห็นที่แตกต่างกัน เพื่อให้ผู้ใช้งานสามารถสื่อสารความคิดที่เป็นนามธรรมให้ออกมาอย่างเป็นรูปธรรมมากยิ่งขึ้น อีกทั้งกระตุ้นให้ผู้ใช้อะไหล่เคลื่อนไหวท่าทางขณะคิดหรืออธิบาย โดยสัมพันธ์กับการกระบวนการทำงานของสมอง

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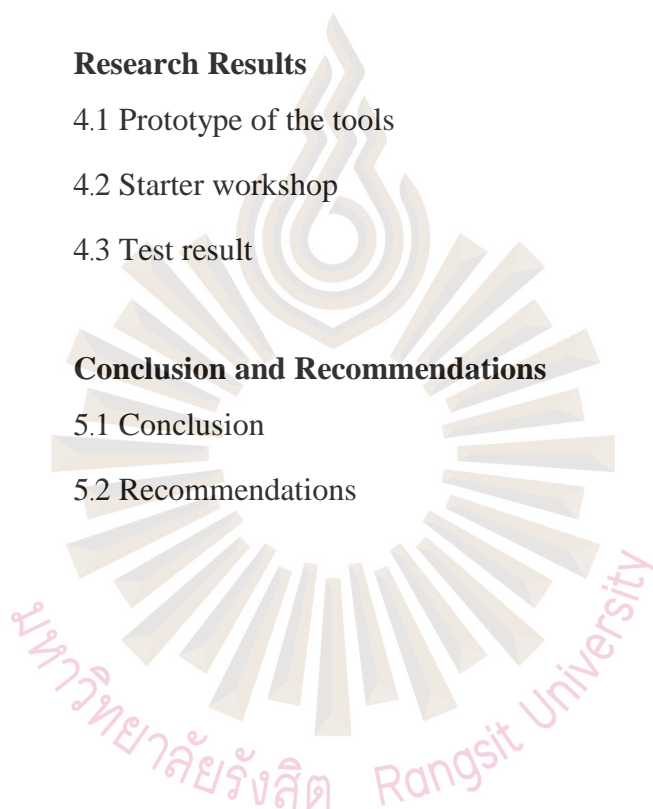
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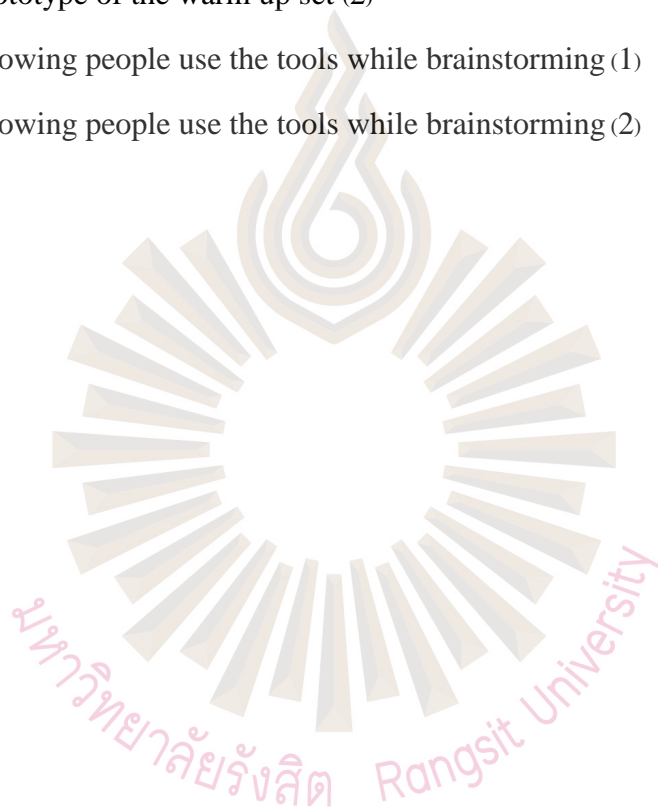
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Chapter 1

Introduction

1.1 Background

Brainstorming sessions done properly encourages the participants to come up with thoughts and ideas in a relaxed and informal environment, allowing them to expand on their ideas in many directions. And the atmosphere during any such session in a meeting or classroom is full of large sheets of paper pinned to the wall or layer out in a table, with Post-it notes, coloured pens, and such simple tools used to capture ideas on paper by hand. Frisch (2016) suggested that “Writing or drawing something by hand tends to boost one’s ability to retain information, comprehend new ideas and be more productive with the added benefit of eliminating the distraction of electronic devices” (p.1-2). Sometimes people are stuck with the ideas and don’t know how to start explaining their ideas, so the author interesting to study the difference of present the ideas by electronic and manual devices, study about the importance of leaning from making things through sensory of touching. Furthermore, use these theories apply to design the tools which encourage people to apply their thinking through the physical model by touching to feel the difference property, and using metaphor to sharing their thought like telling a story.

1.2 Research Objectives

1.2.1 To design tools to encourage people to represent ideas through tactile materials.

1.3 Research Questions/ Assumptions

Making the tools which encourage two- way communication between the user and the tools. Sharing the ideas by power of metaphor.

1.3.1 Encourage people to telling ideas like telling the story and expand the ideas through touching and observing

1.4 Research Framework

This research is for study about the tools for using in creative brainstorming session by observe user's behavior in brainstorming process. From the observation, In meeting room or class room people are encouraged to use the physical tools to express their ideas such as big paper, post-it note and color pen. So author have study more about psychology of hands and mind. Using sensory of touching the physical things apply into the design for develop the tools which can trick some ideas to user, not just let the user put in ideas on the tools. Allow user to explain their ideas more visualize base on real material.

In experiment process author have study the quality of each type of material and choose different material. Make the material in various form for user to use interpret the meaning through visual structure. Separate the tools in to set for users to choose according to their needs.

1.5 Definition of Terms

Tools are used to propose or convey ideas. Whether writing, drawing, or assembling different parts to shape according to the ideas of user.



Chapter 2

Literature Review

2.1 Connection between hands and mind

Nowadays, technology has become a very important part of human life. Due to the convenience and speed of use, but in terms of usability that affects the human brain, still undeniable that working with our own hands affects better understanding and memorization. For example, when we take notes on paper, the notetaker will have an understanding of the notes and can remember what was recorded. The research paper of Mueller and Oppenheimer (2014) argue that “Paper notetakers’ brains are working to digest, summarize, and capture the heart of the information. This promotes understanding and retention.” (p.1-8). From their research have found that participants who take note by hand its tends to process the information into concept more than the participants who use a laptop to take note, it more inclined to take verbatim notes (Figure 2.1).

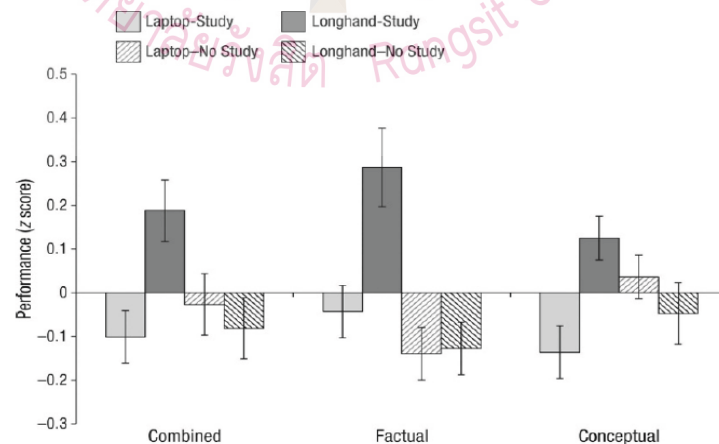


Figure 2.1 Scored performance on factual-recall and conceptual-application questions as a function of note-taking condition

Source: Mueller & Oppenheimer, 2014, p.7

2.2 The thinking hand

Heidegger (1968) connects the hand directly with the human thinking capacity: 'the hand's essence can never be determined, or explained, by its being an organ which can grasp. The hand is a peculiar thing. In the common view, the hand is part of our bodily organism. But the hand's essence can never be determined, or explained, by its being an organ which can grasp. Apes, too, have organs that can grasp, but they do not have hands. The hand is infinitely different from all grasping organs — paws, claws, or fangs — different by an abyss of essence. Only a being who can speak, that is, think, can have hands and can be handy in achieving works of handicraft... Every motion of the hand in every of its works carries itself through the element of thinking, every bearing of the hand bears itself in that element. All the of the is rooted in thinking (p.16)

Working by hand such as drawing, it is the state of deep engagement in thinking through making, allow hand gesture flow with the line and shape of object, whereas drawing by mouse is select the line and the shape from a given set of symbols. So drawing by hand pencil or pen tends to encourage drawer to explore the creative, build the conversation between hand and drawer's mental. Another meaning of the 'drawing' is pulled, it is help drawer pulling out, revealing, and concretising the feeling and imagination in mind. Moreover, the practice of slow time and movement initiates meditation (Pallasmaa, 2009).

2.3 Gesture of hands

Lunenburg (2010) suggest that gestures reveal how people are feeling. People tend to gesture more when they are enthusiastic, excited, and energized. People tend to gesture less when they are demoralized, nervous, or concerned about the impression they are making. gestures, such as

frequent movements to express approval and palms spread outward to indicate perplexity, provide meaningful hints to communication (p.1-2).

When people express their thought by hand, it will produce a gesture of hand even in thinking process such as finger tapping, stroking the chin or touching the head, or communicate the ideas process such as waving the hands while explaining. These have connection to the brain too, the gesture which people produced while they are thinking, such as tap finger on the table, Stroking the chin, touching the head and its have connection between and mind. The gesture people produce while thinking is can reflect to the brain and improve our thinking (Goldin-Meadow, 2006).

2.4 A tactile object approach to learning

An example of popular set of tools used for enabling the connection between hands and mind to enhance communication within a workshop framework is the LEGO Serious Play (LSP) (Figure 2.2). Participants are given a set of short exercises by a trained moderator who sets the guidelines and time limits to build models of a theme or an idea using the Lego bricks, following which all the participants take turns to discuss their creations. By doing so they fire up more parts of their brains than just the working memory. This is called hands-brain-connection where people are more creative and imaginative when using their hands in the context of mental work. Another aspect of LSP is to tell the stories using metaphors that relate to their models everyone has built. Metaphors help to give a deeper meaning to the Lego bricks as the participants do not just build their ideas by physically representing them with the Lego bricks. Hence, LSP is not about constructing, instead, the participants give meanings to the bricks by using metaphors and link these meanings to a story that goes beyond the physical models (Grienitz & Schmidt, 2012). Participants use blocks as mediating artefacts to build symbolic or metaphorical representation of abstract concepts. In this way, the participant's conceptions of intangibles and ideas are concretised by the Lego model.



Figure 2.2 LEGO Serious play

Source: Tang, 2018

Another recent contender which is very similar to the LSP is the Playmobil Pro (Figure 2.3), based around the iconic Playmobil figure. The system includes a carrying case filled with unpainted Playmobil characters and accessories (Zahn, 2019). The participants then give meaning to their creation and the lack of features allows them to interpret their idea in multiple ways.

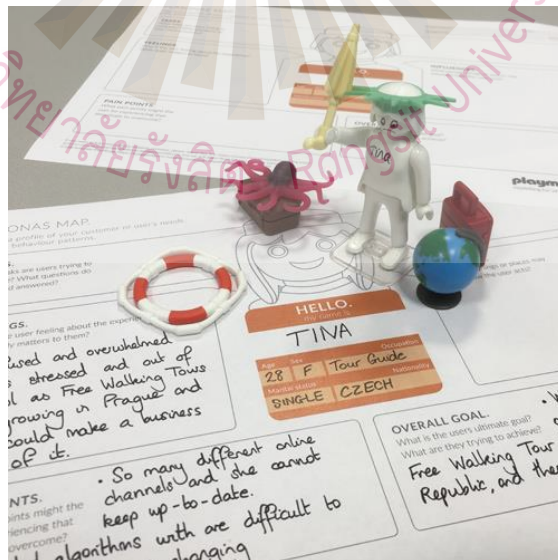


Figure 2.3 Playmobil pro

Source: playmobilpro, 2020

This research wants to use these importance of using hands to communicate thinking through the tactile object to help people expand the ideas in brainstorming process, and the author hope that this research can encourage people to thinking with hands, because Perceive things by touching is the power of sensory. Interpret the meaning of things is the power of metaphor.

2.5 Visual structure

Curtin (2009) suggest that Semiotics is concerned with meaning; how representation, in the broad sense (language, images, objects) generates meanings or the processes by which we comprehend or attribute meaning. For visual images, or visual and material culture more generally, semiotics is an Inquiry that is wider than the study of symbolism and the use of semiotic analysis challenges concepts such as naturalism and realism (the notion that images or objects can objectively depict something) and intentionality (the notion that the meaning of images or objects is produced by the person who created it). Furthermore, semiotics can offer a useful perspective on formalist analysis (the notion that meaning is of secondary importance to the relationships of the individual elements of an image or object). Semiotic analysis, in effect, acknowledges the variable (p.51).

In his book *This Means This, This Means That: A User's Guide to Semiotics* Visual, Hall (2012) says that Object, images and texts are given structure, and hence meaning, through the way in which they are visually composed. Visual compositions have two dimensions: space and time, these two dimensions, in turn, have the two elements of placement (Figure 2.4) (where something is located or is represented as being located) and presence (Figure 2.5) (what something is, or is represented as being, along with how it is rendered) (pp.89-90).

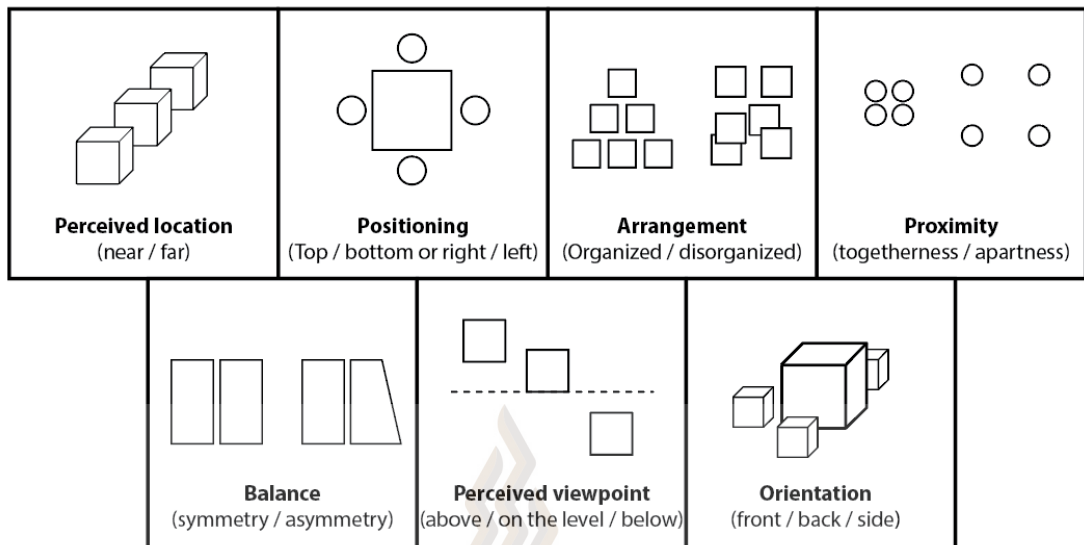


Figure 2.4 Element of placement
Source: adapted from Hall, 2012

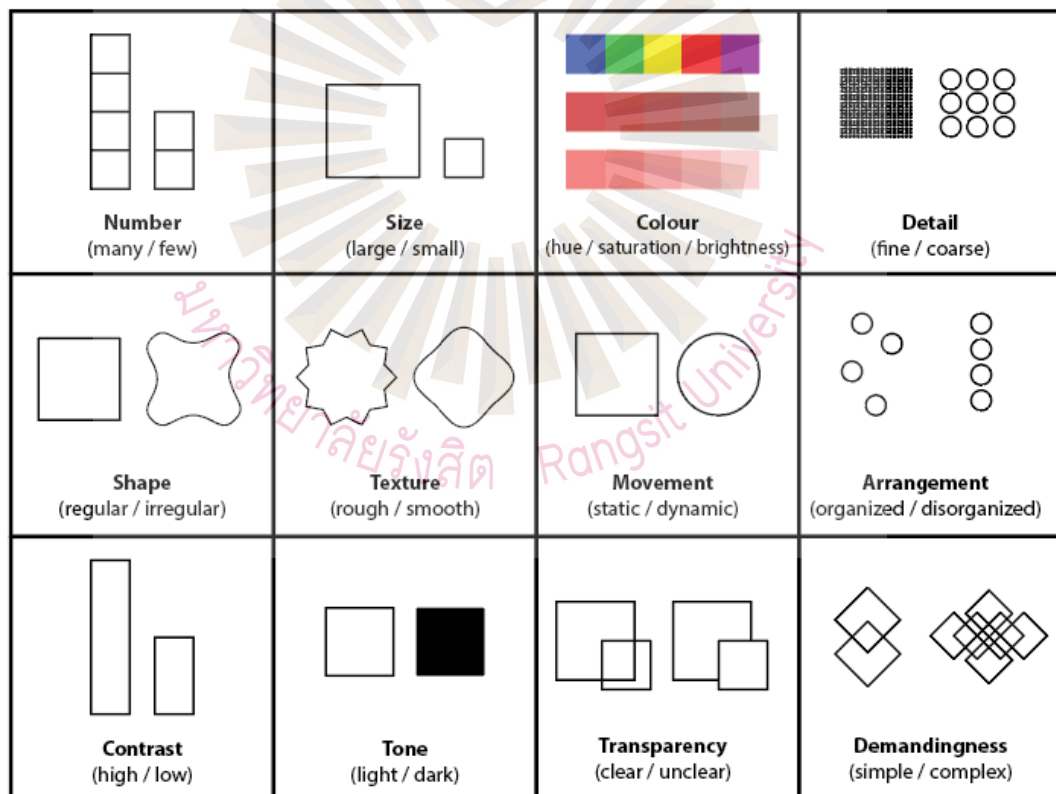


Figure 2.5 Element of presence
Source: adapted from Hall, 2012

Chapter 3

Research Methodology

3.1 Observation

During brainstorming sessions, It encourages people to come up with thoughts and ideas in a relaxed and informal environment, allow people to expand their ideas in all directions and help people to unstuck the ideas by sharing with others to find the new way of thinking. The tools that we use to communicate the ideas also have influenced our thinking. I have Interview the user about the tools that they use while brainstorming. Most of them select to use physical tools such as big paper, post-it note, colour pen, etc. Because these kinds of tools allow them to see the whole picture, easy to understand in visual explanation, giving a well comprehensive and memorization While people use these kinds of hands-on tools. And the gesture of the body produces more while they are thinking and explaining. From observation and study more about the phycological of hands and mind, apply these benefit into the tools for ideas. The form of material is solid and was not have a connection between each one. In future research can add a connection between the material to make the system of the material more complex and have more varied material and form.

3.2 Material and matter

The author looking at the real material which give feeling to user while touching and observing through the texture, colour, weight, temperature, etc. The selected material which people are familiar with and can deal with manufacture on a limited scale. I wanted to contemplate the significance of the different material, concern about the characteristic and feeling.

3.2.1 Plastic, the human-made material gave a softer look, softer feel. The selected type of plastic to use in this project is silicone and acrylic, which have a different character as soft and hard, clear and unclear.

3.2.2 Wood, Its narrative can bring people to the feeling of nature. Each piece of wood has its characteristics, their texture, and color are not the same. The selected type in this project is rubberwood and teak wood.

3.2.3 Clay, it is a symbol of the earth, it is soft and sticky, have the ability to form and retain the shape by an outside force, when we touching the clay can feel the coldness. The selected type of clay is earthenware and porcelain.

3.2.4 Metal is the human-made material that has shiny, reflective, and heavy. The selected type of metal is aluminum and brass.

3.2.5 Stone, The symbolic of strong in nature, rough surface its gave more feeling of texture while touching. The selected type of stone is Marble and Granite.

3.3 The form of material

In this step I have collected different material and form, some is the form from natural and some is forming by human to see the different in the same material. But this time the size and form of each material was too different, so it was easy to distract the user by size and form



Figure 3.1 Found materials

Next step, the author try to find and make each material quite the same size and same form. Experiment the material to see the ability of the material.



Figure 3.2 Found material and experiment material



Figure 3.3 Experiment of acrylic (1)



Figure 3.4 Experiment of acrylic (2)



Figure 3.5 Experiment of teak wood

From the experiment the material, some have a too strong character and each material it didn't look like the same collection. This time I try to design the relationship in each material by form and size.



Figure 3.6 Material experiment

The next step should create a system of form material, shape or texture, bring the physical work into the abstract work. The matrix that I have listed is based on the visual structure.












































































Plastic 	Silicone							
	Acrylic							
Clay 	Earthenware							
	Porcelain							
Wood 	Rubber wood							
	Teak							
Metal 	Aluminum							
	Brass							
Stone 	Marble							
	Granite							

Figure 3.7 The matrix of material and form

3.4 Set of the tools

From the matrix of material and form, I have separate into the first 3 set for the user to choose appropriately.

The set of the tools is separate into three sets, which have the basic, advance and executive. The basic set made of Silicone (Soft), Silicone (hard, opaque), Acrylic (transparent), Rubber wood, Teak wood, Aluminum, Granite (smooth edge) and Granite (rough edge). Most of the material in this set have made in cube form, and the abstract

form allows people to explore about the feeling of each material (texture, colour, flexibility, weight and temperature) by touching and observing.

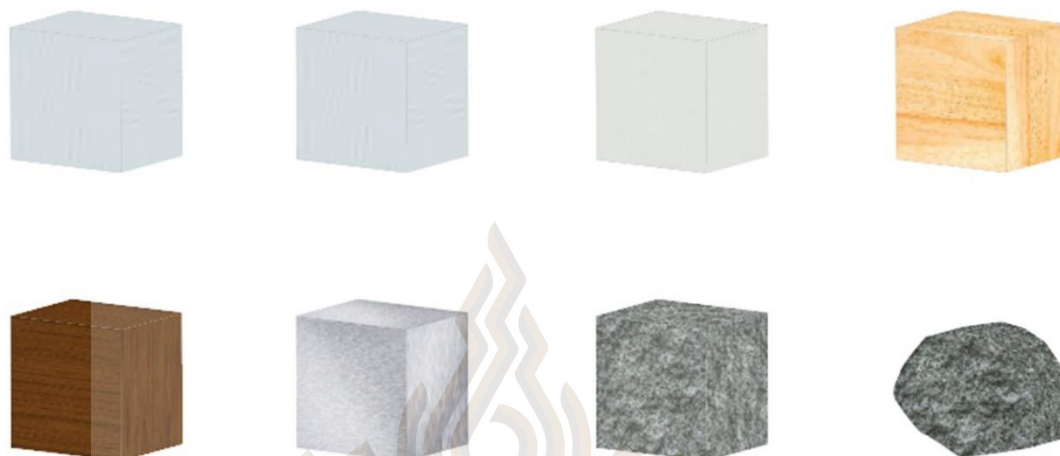


Figure 3.8 The warm up set

The advance set made of Silicone (Soft), Silicone (hard, opaque), Acrylic (transparent), Rubberwood, Teakwood, Earthenware, Stoneware, Aluminum, Brass, Marble and Granite. Explore about the feeling of each material (texture, colour, flexible, weight, temperature), and for practice to interpret the meaning of geometric and abstract form.



Figure 3.9 The advance set

The executive set is the full set which made of Silicone (Soft), Silicone (hard, opaque), Acrylic (transparent), Rubberwood, Teakwood, Earthenware, Stoneware, Aluminum, Brass, Marble and Granite. The form of this set has geometric form and more abstract form which allow the user to apply the idea through perceiving the quality of each material by touching and observing explore about the feeling of each material and apply the idea with geometric and abstract form.

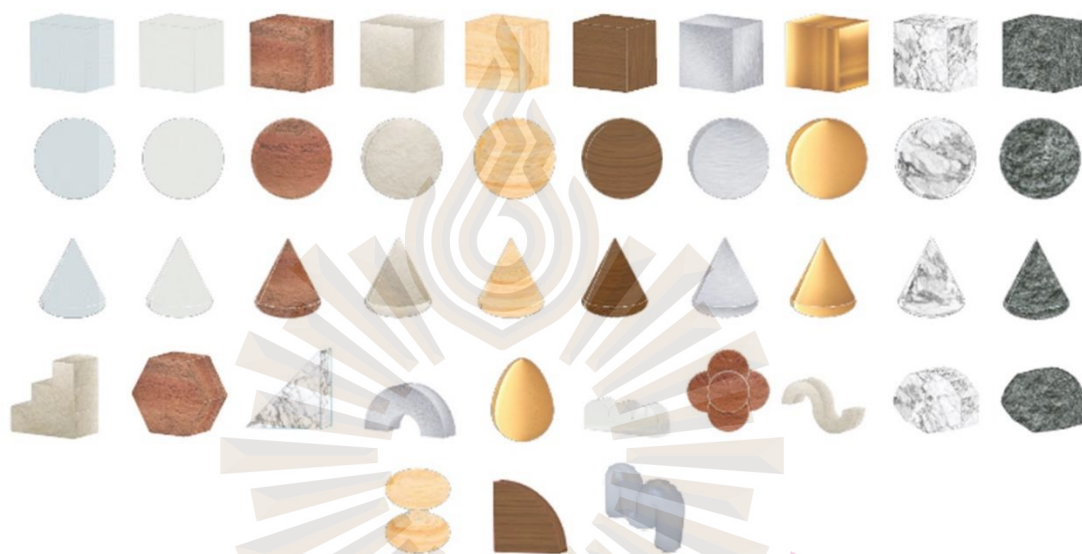


Figure 3.10 The executive set

3.5 Instruction

The instruction of the tools starts with explore step, perceive the information from the tools like colour, texture, weight, temperature and so on. and think about the feeling and meaning in each material. The element and form of material can represent to anything depend on user thinking and the placement which user have locate

Next step is the step of sharing the ideas by metaphor, let user compose the material, considering the material that they use and the position that they put on. Try to metaphor the meaning. relates to the user's context

In each set will have a manual guide to use the tools, telling the information about material and form, also give some advice for the user to start thinking with the tools, the detail as below.

3.5.1 Explore the quality of each object by touching and observing. Try to tell the story of each one.

3.5.2 Describe your vacation by choosing at least two pieces of the object, think about the meaning that you have chosen and the position that you present.

3.5.3 Describe your strengths with the object at least three pieces, think about the story of material that you have chosen and the position that you present.

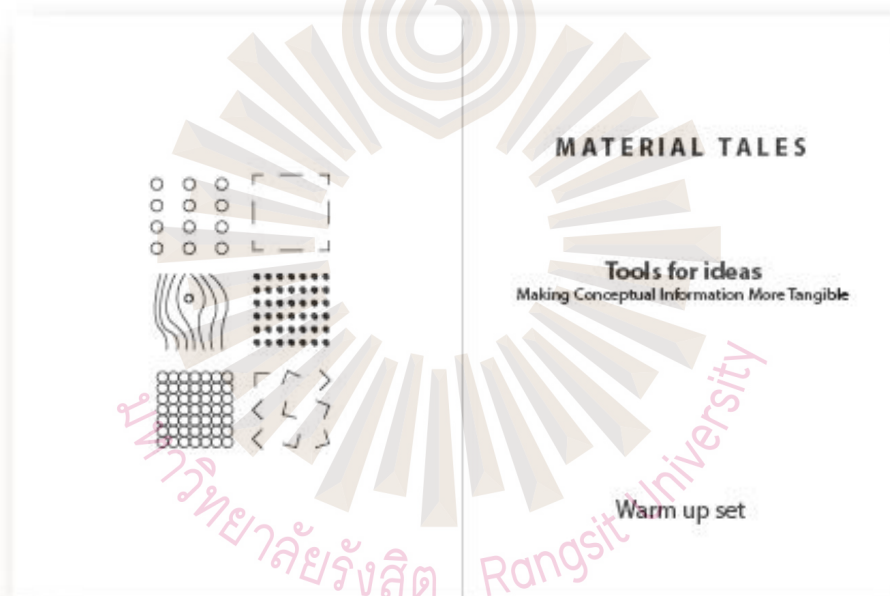


Figure 3.11 The cover of user's instruction manual

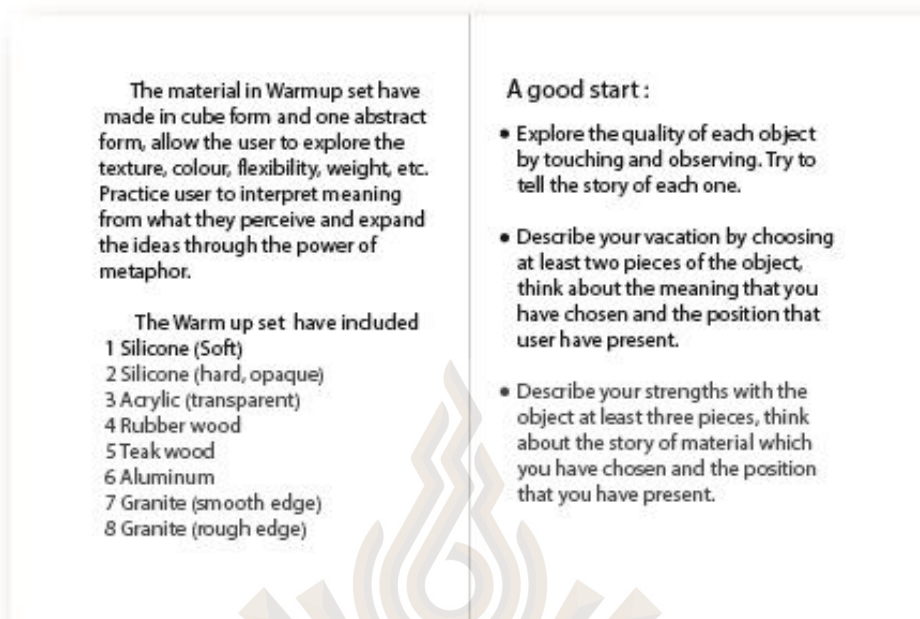


Figure 3.12 The inside of user's instruction manual

3.6 Graphic element

The graphic for use in packaging and manual guide, represent the character of each type of material

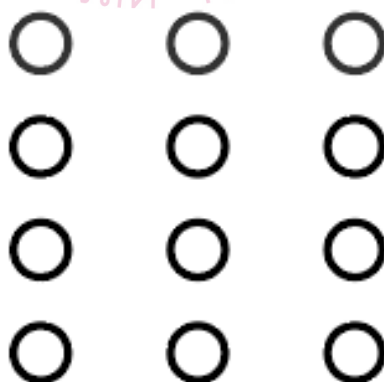


Figure 3.13 Graphic elements of Plastic

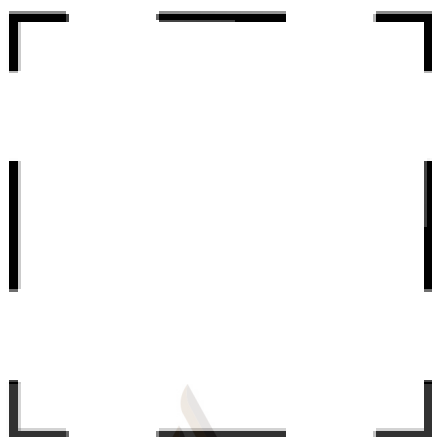


Figure 3.14 Graphic elements of Acrylic



Figure 3.15 Graphic elements of wood

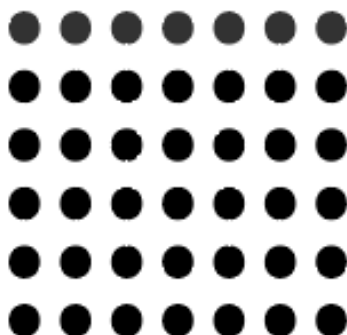


Figure 3.16 Graphic elements of clay

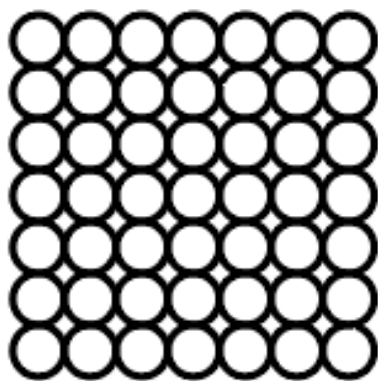


Figure 3.17 Graphic elements of metal

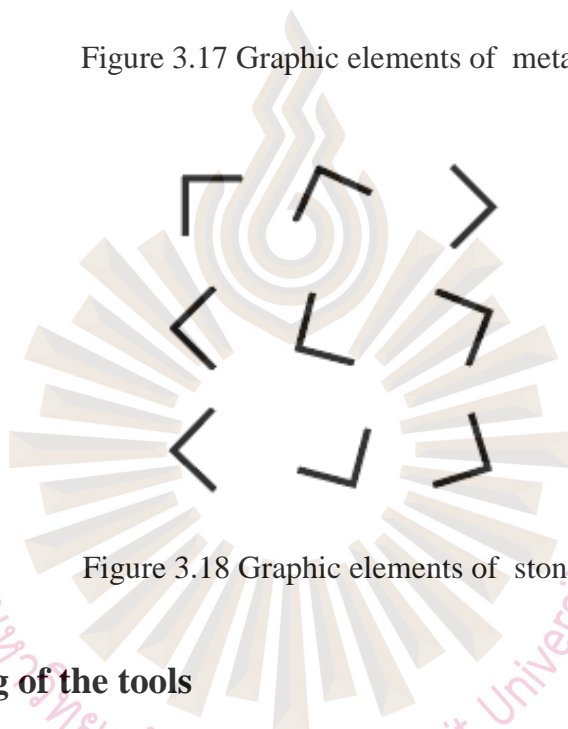


Figure 3.18 Graphic elements of stone

3.7 Packaging of the tools

Experiment used graphic element on packaging

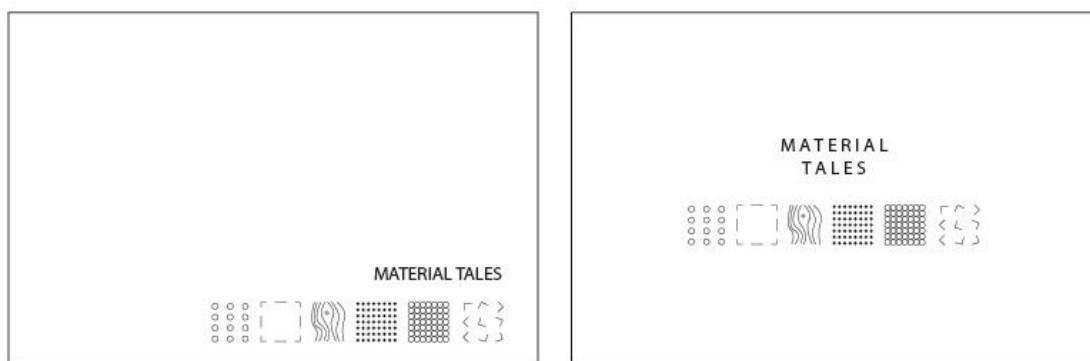


Figure 3.19 Graphic elements on packaging (1)

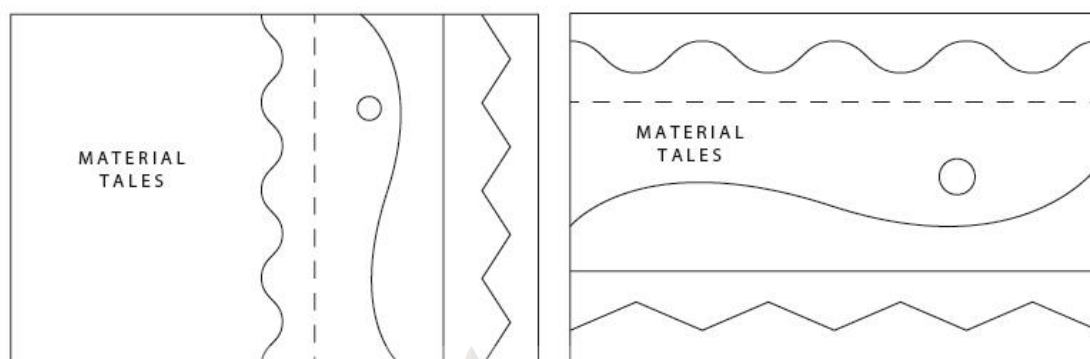


Figure 3.20 Graphic elements on packaging (2)

The size of packaging of warm up set was 12 x 24 centimeter, inside have 8 slots for put the material in.



Figure 3.21 Graphic elements on the packaging

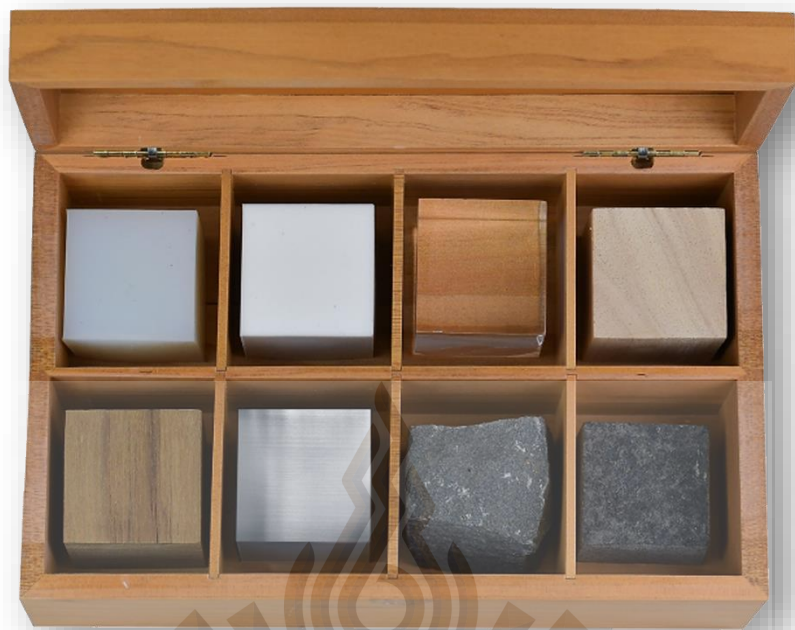


Figure 3.22 inside the packaging



Figure 3.23 packaging and user's guide

Chapter 4

Research Results

The type of material in tools have plastic, clay, wood, metal and stone, which have natural and human-made. The selected material that people quite familiar and can give some guidance for the user to tell the story behind. Each type of materials has two different kinds of comparing the difference of quality, feeling and meaning. The chosen forms have a geometric and abstract form. The geometric forms have the meaning of there own in term of design. It's easy to allow people to interpret the meaning such as cube it can representing the stability, equation, etc. Some form is the abstract form allow people to think the meaning base on their context and experience.

4.1 Prototype of the tools

The prototype of the first set is warm up set, which made by cube form and the size of each one not exceed 5 x 5 centimetres



Figure 4.1 Prototype of the warm up set (1)

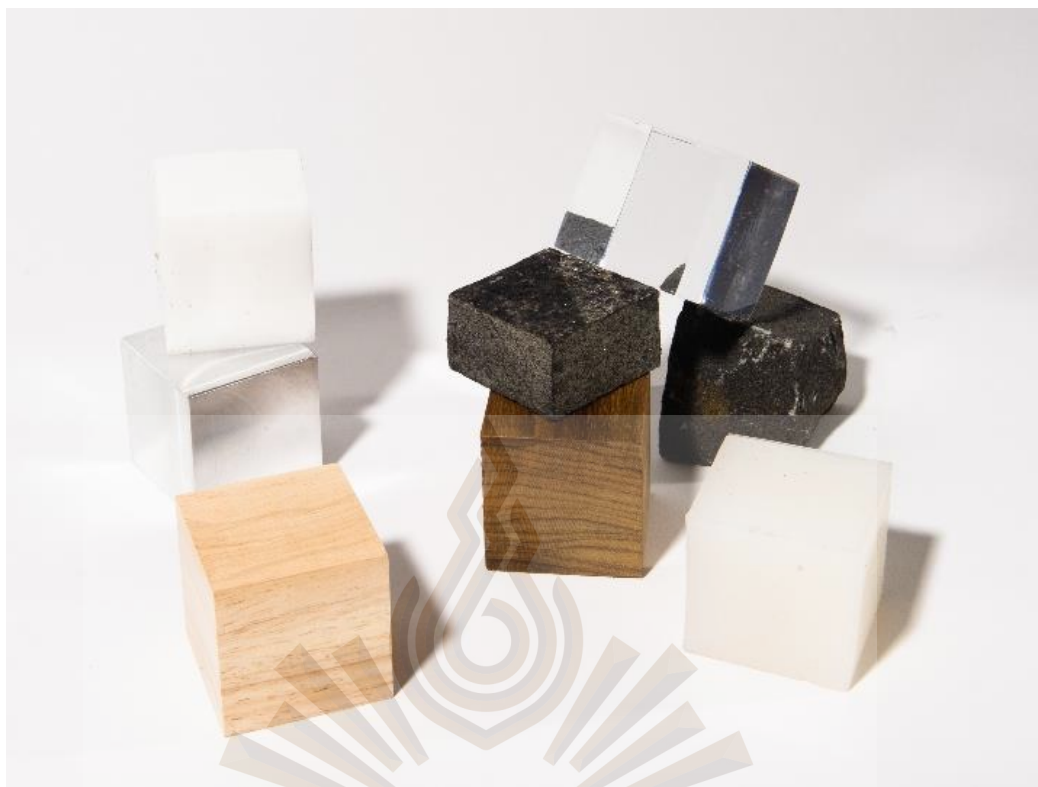


Figure 4.2 Prototype of the warm up set (2)

4.2 Starter workshop

The purpose of using the tools is to identify characteristic of the material and explore how these relate to user's context, let sharing their thoughts about the material, the form and the placement, metaphor give a deeper meaning to the material. The participants do not compose their ideas just by representing them with the material, but the participants give meanings to the material by using metaphor and link these meanings to a story of physical material. It is the step participants start the process of sharing and reflection.

The first step was for participants familiar with the tools. They are asked to choose 1 piece of the material to describe their character of yourself, sharing the story by explaining how the selected material relates to their character.

The next step is to introduce the process of composing physical material to represent the ideas. The participants are asked to build the house by composing the material. Everyone has to describe their own house, mainly using metaphor.

The last step is to introduce the process of composing symbolic representation with the tools. The participants are asked to compose the material to describe the more abstract ideas, such as the exciting experience in their life context, encourage participant to try to tell a story by using the material that participants have composed.

4.2 Test result

Test the first set of tools with students in the college of design. The topic for brainstorming was to build the dream house, ask the user to select the material and compose it to explain their thinking.



Figure 4.3 Participant use the tools to represent their thinking about the interesting in Design (1)

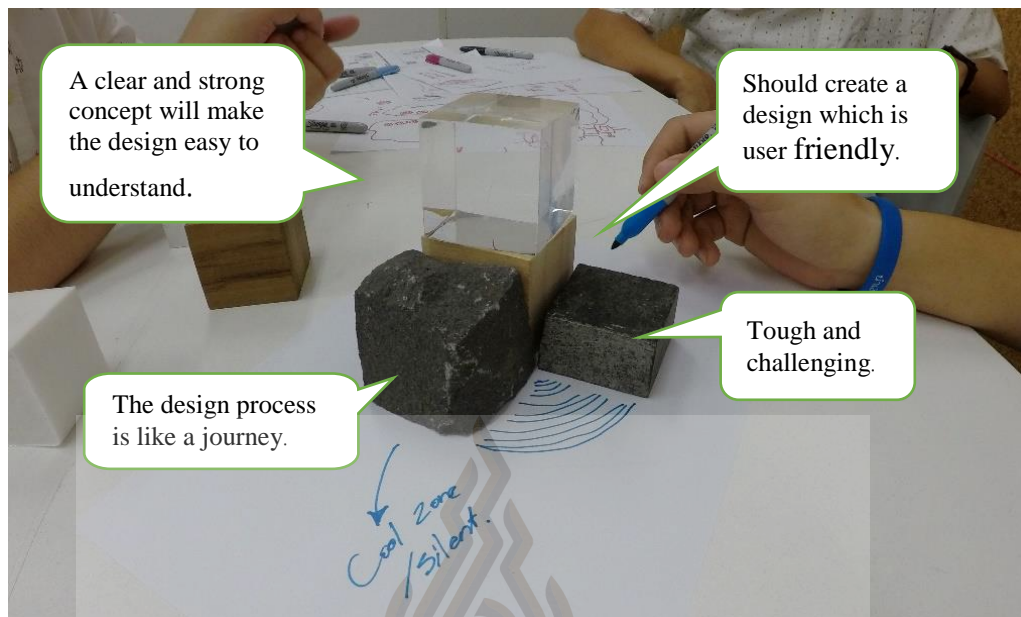


Figure 4.4 Participant use the tools to represent their thinking about the interesting in Design class (2)

Using the character of material and form as a metaphor helped the participants to pay attention to what was being said in explanation of abstract concepts, thereby assisting in a higher level of concentration and creativity in brainstorming sessions.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

Due to the differences in the recording by hand and electronic tools, information is captured differently and compared to digital devices, a traditional notebook has an additional and more powerful benefit, and that is its ability to fire up more parts of the brain due to the tactile nature of the physical tool. Although digital devices have many other advantages they cannot completely replace traditional note-taking by hand. Additionally, gestures, when combined the tactility of physical objects, can trigger higher levels of creativity.

The author designed tools based on these principles that encourage users to interact with them and their unique character due to difference in materials and texture helps the users to communicate their ideas better and apply their imagination to convert their ideas in a more concrete form.

5.2 Recommendations

The form of material is solid and was not have a connection between each one. In future research can add a connection between the material to make the system of the material more complex and have more varied material and form.

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