

# Muscle: The Tactile Texture Designed for the Blind

Chantana Insra

**Abstract**—The research objective focuses on creating a prototype media of the tactile texture of muscles for educational institutes to help visually impaired students learn massage extra learning materials further than the ordinary curriculum. This media is designed as an extra learning material. The population in this study was 30 blinded students between 4<sup>th</sup> - 6<sup>th</sup> grades who were able to read Braille language. The research was conducted during the second semester in 2012 at The Bangkok School for the Blind. The method in choosing the population in the study was purposive sampling. The methodology of the research includes collecting data related to visually impaired people, the production of the tactile texture media, human anatomy and Thai traditional massage from literature reviews and field studies. This information was used for analyzing and designing 14 tactile texture pictures presented to experts to evaluate and test the media.

**Keywords**—Blind, Tactile Texture, Muscle.

## I. INTRODUCTION

FROM a data base of registered people with disabilities, the National Office for Empowerment of Persons with Disability [1] showed a statistic of people with disabilities from November 1<sup>st</sup>, 1994 to 31<sup>st</sup> of May, 2012, were 1,268,614 persons where 694,270 were males and 574,226 were females. These groups of people were considered to be in a lower level of social status, since disabled people in society are often seen to be a social burden, incapable of helping themselves and dependent on supporting from their family or social welfare. According to employment status, some organizations do not give opportunity to the disabled as the disability might hinder performance. The acquisition of quality including safety is not easy for the disabled. And society is likely to consider that Disabled people are mostly non-economical in need of patronage. In fact, most of all the disabled have ability to take care of themselves, if they receive adequate education or appropriate training [2].

Problems that the disabled often find in occupations

1. Disability persons, their families, employers, stakeholders, and general clients lack an understanding of how to implement constructive attitude towards the disabled, which demand factors that led to create promotion and support of the disabled in an occupation.
2. Limitations caused by a disability mean they cannot reach full potential unless rehabilitated which may include medical care, education, social, and professional training.

3. Lack of instruments to support a disability including Pharmaceutical waste, technology facilities, and appropriate helping to do the occupation.
4. Education degrees did not meet standard qualifications that employers needed, since most of them graduated at the level of elementary or secondary school.
5. Their knowledge, experience, and skills for the occupation were not compatible to the level that employers demanded.
6. Levels of knowledge, experience and skills for the occupation are not consistent with the needs of employers.
7. Lack of coaching, or occupational skills training, to work in harmony with the needs of both public and private agencies.
8. Education for the disabled was not conducive to the professional.
9. Lack of funding to get into an occupation.
10. Having difficulty getting to work, no facilities for travel, inability to use public transport, cause travel to work more costly, and high probability of accident.
11. Lack of knowledge and experience in human relations, or inability to collaborate with others.
12. Lack of business knowledge, underdeveloped products including inability to create value added of goods and services, and also lack of creative thinking to initiative self-employed.
13. The market for products of the disabled is not available.
14. Lack of special department to give counseling and guidance concretely which lead to the effectiveness of outcomes [3].

In fact, it is known that disabled people can do almost all kinds of work, if only they are given a chance to get an education and the physical condition is not too much of a barrier. They have ability to earn success in various occupations. Let us consider those who are visually impaired or disabled with a vision problem, according to the ID card with disabilities in Thailand from 1<sup>st</sup> November 1994 to 31<sup>st</sup> May 2012, there were 141,784 people, of those 68,889 were male and 72,895 were female, this group has a major limitation in studying and access to education and employment, compared to others. Thus it is important that they have support and help in order to become self-reliant. At present, there are some organizations, both private and public, that provide training and courses in massage for visually impaired people in Thailand so that they can be able to sustain their families and themselves. But there are problems with communication and learning, since they cannot see the images. Thus, there is a need to create a media that can help learning, especially the image of the body and the muscle system in order to achieve familiarity or understanding before actual implementation.

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Currently, more rights and educational opportunities are being given to the visually impaired so that they could lift themselves up to equal opportunities. Educating for professions is offered in elementary school classes which can lead to a positive attitude and create inspiration in choosing to pursue a career. In experiencing and learning about muscles, may link to knowledge of Health and Physical Education, which in turn may be an aid a decision in choosing a career in the future.

The visually impaired is a group of disabled people who have impaired vision either blind or partially blind. This group of people perceives surface shapes and size of an object by using the media and their fingertips. Thus, media used to promote appropriate learning, has a convex surface from a lower plane.

Visual salience (tactile texture) refers to the communication tools in which the visually impaired perceive shape, characteristics, structure and scopes of objects, with their mine through touching. In this media with convex with enhance relief can create more understanding, and learning for the blind [4].

In studying massage, it is important to understand body movement and the muscle system. The tactile texture of the properly design media will allow the visually impaired to learn the muscle system through touch. In other words, these illustrations of designed media depicting muscles should aid understanding.

Therefore, the research is related to massage muscles to determine the appropriate manner of constructing a model for the visually impaired. The module will benefit potential recognition, and benefit will fall directly upon the visually impaired on their further career.

## II. OBJECTIVES

- 1) To study the process and methods of designing tactile texture pictures for the blind.
- 2) To search and analyze patterns to use in the design process
- 3) To create tactile texture pictures under the topic of Muscle which can create imagination for the blind.
- 4) To develop the media for the blind and provide to related organizations.

## III. METHODOLOGY

### A. Population of Study

30 blind students who are able to read the Braille language in The Bangkok school for the blind between grade 4 -6 in the second semester 2012

### B. Research Tools

14 pictures of Muscle copied on Brailon paper.

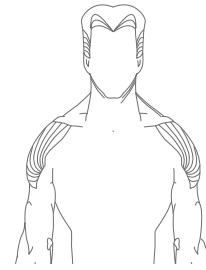


Fig. 1 Anterior Deltoid

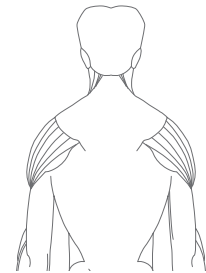


Fig. 2 Deltoids

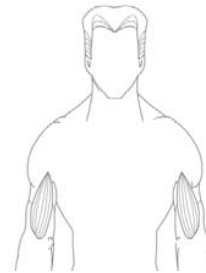


Fig. 3 Biceps

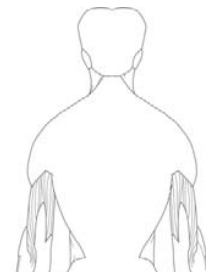


Fig. 4 Triceps

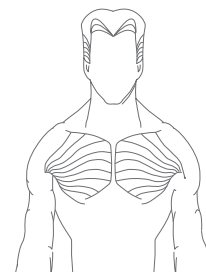


Fig. 5 Pectoralis

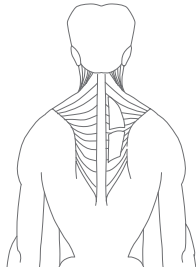


Fig. 6 Trapezius

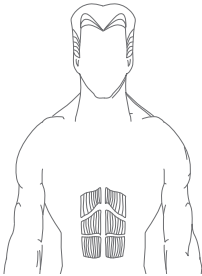


Fig. 7 Abdominals

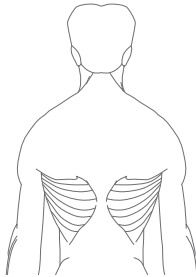


Fig. 8 Latissimus Dorsi

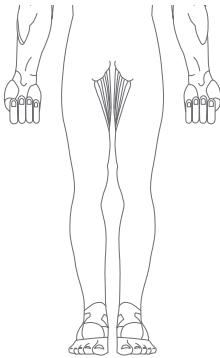


Fig. 9 Hip Abductors

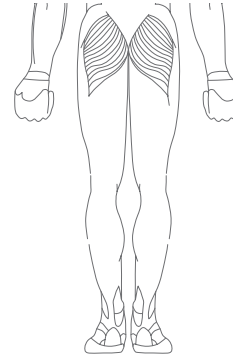


Fig. 10 Gluteus

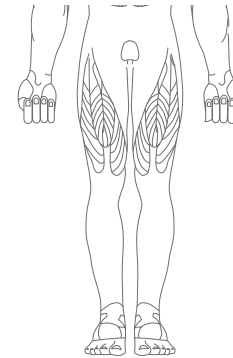


Fig. 11 Quadriceps

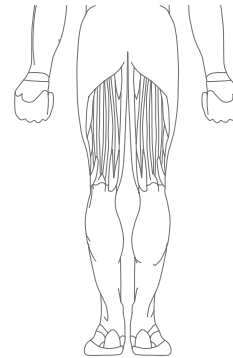


Fig. 12 Hamstrings

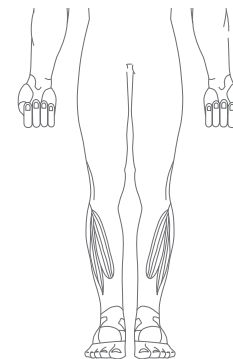


Fig. 13 Soleus

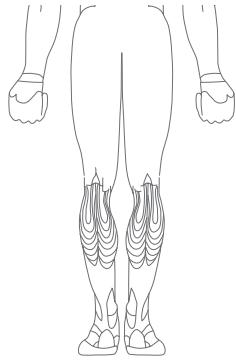


Fig. 14 Gastrocnemius

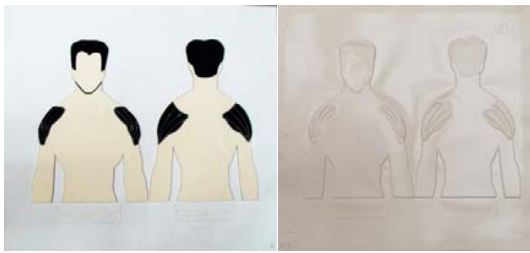


Fig. 15 Original and Finished Images of Anterior Deltoid and Deltoids



Fig. 16 Original and Finished Images of Biceps and Triceps



Fig. 17 Original and Finished Images of Pectoralis and Trapezius



Fig. 18 Original and Finished Images of Abdominals and Latissimus Dorsi



Fig. 19 Original and Finished Images of Hip Abductors and Gluteus



Fig. 20 Original and Finished Images of Quadriceps and Hamstrings



Fig. 21 Original and Finished Images of Soleus and Gastrocnemius

### C. Questionnaire

Questionnaires used for the visually impaired students consisted of 2 parts, part one was a survey of understanding the media while the second part data with level of satisfaction with the media through 5 rating scales: most satisfaction, more satisfaction, moderate level, less level, and the least [5].

### IV. RESULT

Of experimental research tools visual salience "muscles" to engage in the practice of massage for the visually impaired, by means of interviews, target is a group of completely blind visually impaired children who were able to read Braille and were in Primary grade 4-6 at a school for the blind people. Thirty students were selected from this group to reveal preference upon understanding the use of Media Embossed, including satisfaction with the media. The work captures attention as could be seen from the audience questions.

TABLE I  
NUMBER AND PERCENTAGE OF STUDENTS WITH AN UNDERSTANDING OF THE  
USE OF MEDIA EMBOSSED (N = 30)

Figure No.	Understanding of the visual salience (Number / percentage)				The least
	The most	Above average	Average	Less	
1. Anterior Deltoid	7 (23.33)	9 (30)	8 (26.67)	6 (20)	
2. Deltoids		10 (33.33)	17 (56.67)		3 (10)
3. Biceps		6 (20)	11 (36.67)	9 (30)	
4. Triceps	4 (13.33)	10	13	5	2
5. Pectoralis		5 (16.67)	15 (50)	7 (23.33)	3 (10)
6. Trapezius		8	13	9	
7. Abdominals		8 (26.67)	13 (43.33)	9 (30)	
8. Latissimus Dorsi		8	12	9	1
9. Hip Abductors		8 (26.67)	12 (40)	9 (30)	1 (3.33)
10. Gluteus					
11. Quadriceps					
12. Hamstrings					
13. Soleus					
14. Gastrocnemius					

Table I shows the target students group of 30 students from class level Primary Education 4<sup>th</sup>-6<sup>th</sup> and their use of this visual convex media. The specific classifications are as follow:

Figs. 1 and 2 indicated that most students had a level of satisfaction of high with 9 students (30%) ranking at number 1, while 8 students (26.67%) had a moderate level of satisfaction with a ranking of number two, 7 students (23.33%) had the highest level of satisfaction with a ranking of number three and 6 students (20%) had a low level of satisfaction with a ranking number 4 and none of them indicated the lowest level of satisfaction.

Figs. 3 and 4 indicated that most students had a level of understanding at a moderate level with 17 students (56.67%) which ranking to be number 1, while 10 students (33.33%) had a high level of understanding with a ranking of number two, 3 students (10%) had the lowest level of understanding with a ranking of number three and none of them indicated the highest level or lower level of understanding.

Figs. 5 and 6 indicated that most students had a level of understanding of a moderate with 11 students (36.67%) ranking at number 1, while 9 students (30%) had a low level of understanding which ranking to be number two, 6 students (20%) had a high level of understanding with a ranking of number three, 4 students (13.33%) had a highest level of understanding with a ranking of number four and none of them indicated the lowest level of understanding.

Figs. 7 and 8 indicated that most students had a level of understanding of moderate with 13 students (43.33%) ranking of number 1, while 10 students (33.33%) had a high level of understanding ranking of number two, 5 students (16.67%) had a low level of understanding with a ranking to be number three, and 2 students (6.67%) had a lowest level of understanding with a ranking of number four.

Figs. 9 and 10 indicated that most students had a level of understanding of moderate with 15 students (50%) ranking at number 1, while 7 students (23.33%) had a low level of understanding with a ranking of number two, 5 students (16.67%) had a high level of understanding with a ranking of

number three, 3 students (10%) had a least level of understanding with a ranking of number four and none of them indicated the highest level of understanding.

Figs. 11 and 12 indicated that most students had a level of understanding of moderate with 13 students (43.33%) ranking at number 1, while 9 students (30%) had a low level of understanding with a ranking of number two, 8 students (26.67%) had a high level of understanding with a ranking of number three, and none of them indicated the highest and lowest level of understanding.

Figs. 13 and 14 indicated that most students had a level of understanding at a moderate with 12 students (40%) ranking at number 1, while 9 students (30%) had a low level of understanding with a ranking of number two, 8 students (26.67%) had a high level of understanding with a ranking of number three, and 1 student (3.33%) had a lowest level of understanding.

TABLE II  
THE AVERAGE AND STANDARD DEVIATION OF THE NUMBER OF STUDENTS  
WITH AN UNDERSTANDING OF THE USE OF MEDIA EMBOSSED (N = 30)

Figure No.	Average $\bar{X}$	Standard Deviation S.D	Understanding Level
1. Anterior Deltoid	3.57	1.07	Above average
2. Deltoids			
3. Biceps	3.13	0.86	Average
4. Triceps			
5. Pectoralis	3.17	1.02	Average
6. Trapezius			
7. Abdominals	3.03	0.89	Average
8. Latissimus Dorsi			
9. Hip Abductors	2.73	0.87	Average
10. Gluteus			
11. Quadriceps	2.97	0.76	Average
12. Hamstrings			
13. Soleus	2.90	0.84	Average
14. Gastrocnemius			

From Table II, the average number of student who understands the Embossed the media was shown to be 3.07. Overall, with the standard deviation of 0.90 and level of understanding was at a moderate level. Specific classifications are as follows:

Figs. 1 and 2 indicated that the average number of students who understand Embossed with the media was 3.57, with the standard deviation equal to 1.07 and level understanding was at a high level.

Figs. 3 and 4 indicated that the average number of students who understand Embossed with the media was 3.13, with the standard deviation equal to 0.86 and level understanding was at a moderate level.

Figs. 5 and 6 indicated that the average number of students who understand Embossed with the media was 3.17, with the standard deviation equal to 1.02 and level understanding was at a moderate level.

Figs. 7 and 8 indicated that the average number of students who understand Embossed media was 3.03, with the standard deviation equal to 0.89 and level understanding was at a moderate level.

Figs. 9 and 10 indicated that the average number of students who understand Embossed media was 2.73, with the standard

deviation equal to 0.87 and level understanding was at a moderate level.

Figs. 11 and 12 indicated that the average number of students who understand Embossed media was 2.97, with the standard deviation equal to 0.76 and level understanding was at a moderate level.

Figs. 13 and 14 indicated that the average number of students who understand Embossed media was 2.90, with the standard deviation equal to 0.84 and level understanding was at a moderate level.

TABLE III  
NUMBER AND PERCENTAGE OF THE SATISFACTION OF THE MEDIA USAGE  
(N = 30)

Numbers of students	Level of satisfaction				
	The most	Above average	Average	Less	The least
30	24 (80)	6 (20)			

From Table III, the satisfaction of 30 students from grade 4-6 toward the media at the most satisfied level is 80% (24 students). And the satisfaction rate at the level of above average is 20% (6 students).

TABLE IV  
THE AVERAGE NUMBER OF STUDENTS WHO ARE SATISFIED WITH THE EMBOSSED (N = 30)

Number of students	Average $\bar{X}$	Standard Deviation S.D	Level of Satisfaction
30	4.80	0.41	Highest

From Table IV, the overall average satisfaction of the students, with the Embossed on the media was 4.80 with a standard deviation equal to 0.41; and the level of satisfaction was at the highest level.

## V. CONCLUSION

From the experiment, using "Muscle" the tactile texture designed for the blind can be summarized as follows.

Average understanding of the use of Media Embossed was at the level of moderate. The result of the interview found that the target group had no interest in a future career. The presentation was quite difficult to understand, and also does not exist in the lesson. Therefore, an instructor should be assigned to accompany teaching by linking to a course in health education, and also giving more time to study in order to get more understanding.

For the average uses satisfaction towards visual salience, the level of satisfaction was at the most satisfaction. This is due to the fact that the target group of students still needed to learn directly from touching Embossed media exposure as well as Embossed Braille. The embossed media helped to stimulate imagery and in turn stimulate perception of sense according to stories, besides in class lessons generated even more benefit.

## ACKNOWLEDGMENT

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