KNOWLEDGE AND ATTITUDE ON USING WHITE CANE OF THE VISUALLY IMPARED STUDENTS IN THE SECONDARY SCHOOLS IN BANGKOK

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KNOWLEDGE AND ATTITUDE ON USING WHITE CANE OF THE VISUALLY IMPARED STUDENTS IN THE SECONDARY SCHOOLS IN BANGKOK

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ABSTRACT

This study was a survey research. The objective of the study was to determine the knowledge and attitudes to a using white cane of students with visual impairment who studied in secondary schools in Bangkok. Questionnaires in Braille were given to 45 students with visual impairment (20 male and 25 female) who were in Matayom 1 – 6 in 7 secondary schools in Bangkok. The schools were: Santirat Wittayalai School, Samsen Wittayalai School, Sri Ayudhya School, Wat Makutkasat School, Shinoros Wittayalai School, Thep Lila School and St. Gabriel School. The data were collected from December 2003 to January 2004.

According to the study, the knowledge of most students (64.4%) about the white cane is higher than the moderate level, and 62.2% of them have positive attitudes towards the white cane. There is no relationship between knowledge and attitudes of the students to using a white cane. It can be interpreted that different levels of knowledge about the white cane do not relate to the students' attitudes towards it.

Suggestions

1. When providing Orientation and Mobility (O&M) training to people with visual impairment, the instructor should include topics about the details of the white cane, such as types of white cane, and how to use a white cane in different environments, so that they could choose the appropriate white canes for themselves and know how to use it properly.
2. People with visual impairment should receive regular O&M training so that they can review and practice what they have learned and can improve their skills.

KEY WORDS: KNOWLEDGE, ATTITUDE, WHITE CANE, VISUALLY IMPAIRED STUDENTS

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ระดับความรู้และทัศนคติต่อการใช้ไม้เท้าขาวของนักเรียนที่มีความบกพร่องทางการเห็นระดับมัธยมศึกษาในเขตกรุงเทพมหานคร (KNOWLEDGE AND ATTITUDE ON USING WHITE CANE OF THE VISUALLY IMPAIRED STUDENTS IN THE SECONDARY SCHOOLS IN BANGKOK)

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บทคัดย่อ

การวิจัยครั้งนี้เป็นการวิจัยเชิงสำรวจ โดยมีวัตถุประสงค์เพื่อศึกษาระดับความรู้และทัศนคติต่อการใช้ไม้เท้าขาวของนักเรียนที่มีความบกพร่องทางการเห็นระดับมัธยมศึกษาในเขตกรุงเทพมหานคร ทำการเก็บข้อมูลโดยการแจกแบบสอบถามที่ทำเป็นอักษรเบรลล์ให้กับนักเรียนที่มีความบกพร่องทางการเห็นที่ศึกษาอยู่ในระดับมัธยมศึกษาปีที่ 1-6 จำนวน 45 คน (ผู้ชาย 20 คน ผู้หญิง 25 คน) จากโรงเรียนกลุ่มตัวอย่าง 7 โรงเรียน ได้แก่ โรงเรียนสันติราษฎร์วิทยาลัย โรงเรียนสามเสนวิทยาลัย โรงเรียนศรีอยุธยา โรงเรียนวัดมกุฎกษัตริย์ โรงเรียนชิโนรสวิทยาลัย โรงเรียนเทพลีลา โรงเรียนเซนต์คาเบรียล ในระหว่างเดือนธันวาคม พ.ศ. 2546 ถึงเดือนมกราคม พ.ศ. 2547

ผลการศึกษาพบว่า ระดับความรู้เกี่ยวกับการใช้ไม้เท้าขาวของนักเรียนที่มีความบกพร่องทางการเห็น คิดเป็นร้อยละ 64.4 สูงกว่าระดับปานกลาง และทัศนคติที่มีต่อการใช้ไม้เท้าขาวส่วนใหญ่มีทัศนคติเป็นไปในเชิงบวก คิดเป็นร้อยละ 62.2 ส่วนความสัมพันธ์ระหว่างความรู้และทัศนคติพบว่าไม่สัมพันธ์กัน แสดงว่าระดับความรู้ที่ต่างกันไม่มีความสัมพันธ์ต่อทัศนคติในการใช้ไม้เท้าขาวของคนพิการทางการมองเห็น

ข้อเสนอแนะในการวิจัยครั้งนี้คือ

1. ผู้สอนควรจะสอนวิชา ความคุ้นเคยกับสภาพแวดล้อมกับการเคลื่อนไหว(O&M) เรื่องเกี่ยวกับเฉพาะไม้เท้าขาวมากกว่านี้ เช่น ชนิดของไม้เท้าหรือวิธีการใช้ไม้เท้าตามสภาพแวดล้อม ฯลฯ เพื่อนักเรียนที่มีความบกพร่องทางการเห็นเลือกไม้เท้าขาวที่เหมาะสมกันตนเอง นักเรียนสามารถจะใช้ไม้เท้าได้ถูกวิธี
2. ควรจะสอนวิชา O&M อย่างต่อเนื่องและเป็นระยะๆ เพื่อไม่ให้ลืมสิ่งที่เรียนไป และเพื่อปรับปรุงแก้ไขทักษะ O&M ของตนให้พัฒนาดียิ่งขึ้น

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CHAPTER 1
INTRODUCTION

Background and Significance of the Problem

White cane is a travel aide that is extensively used by blind individuals all over the world. It serves the purpose of identification as the symbol of the blind. With a white cane, blind people can travel independently, the skills blind people use when traveling are formally called Orientation and Mobility (O&M) skills, which are divided into 4 categories as followed:

1. Travel with a white cane
2. Travel with a sighted guide
3. Travel with a dog guide
4. Travel with and electronic travel aide

Each of these travel means has different advantages and disadvantages. However, travel with a white cane seems to be the most popular among blind people since it has many advantages. A cane user, for example, can identify the terrains and be aware of the barriers in the environments from the touch of the tip of the cane before stepping forward. It is also easy to use and take care of. Besides, the price of a white cane and the maintenance cost are not high.

Not only is the white cane an effective travel aide for blind people, but it also helps them live independently as well as improve their quality of life and self-reliance. Some of the examples include going to work, socializing with friends, or even seeing a doctor, all of which can be achieved by using the white cane and O&M skills. As the O&M skills have a great impact on the lives of blind people, the O&M instructors as well as those who work with blind individuals should be fully aware of

the importance of the white cane to blind individuals.

The current number of students with visual-impairment integrating in regular schools in Thailand is 2,228 (Department of General Education, 1998). According to the article 10 of the National Education Act 1999, each individual has equal right and opportunity to receive free and quality basic education provided by the state for at least 12 years.

As for the education of individuals with physical impairment, mental impairment, cognitive impairment, emotional impairment, social impairment, communication and learning impairment, individuals with physical disabilities, as well as dependent or under-privileged individuals; it is stated that these individuals in particular also have equal right and opportunity to receive basic education.

According to the Act, the individuals with disabilities are provided with appropriate education since birth or the first detection of disabilities. They are also eligible to receive devices, materials, services, and assistance under the criteria and procedures as stated in the ministry regulations.

The plan for the development of education, religion, and culture in phrase 7 (1994 – 1996) stated that the Ministry of Education is to set a policy to expand the education opportunity after Pratom 6 to reach 90 per cent by the year 1996. To implement this policy, the agencies in charge need to recruit school-aged children to the highest number, including children with disabilities.

Consequently, the integration program was set up in order that every child who has disabilities would be able to learn and to have a normal, happy life. Being a part of the society, individuals with disabilities deserve being treated as a person and with concern, understanding assistance and equal opportunities to develop themselves. It is necessary to help them be well-prepared for a social life and participation with normal people (Department of General Education, 1999: 3).

The handbook of Integration Program Management (Special Education Project, Asian Education Development Project, 1996: 3) cites the reasons for providing special education in regular schools or integrative education in regular schools as followed:

1. Children with disabilities can attend the schools near their homes instead of the special schools far way, which causes an accommodation problem to their parents.
2. It saves traveling costs to attend a school nearby.
3. The children can stay with their family and live as a family member instead of having to retreat to a special residential school.
4. The children can have an opportunity to learn and socially adjust themselves.
5. It lessens the burden borne by the government.
6. It helps raise public awareness and acceptance that children with disabilities have equal competencies and can be productive members of the society.

Because of their impaired vision, blind people inevitably have problems when traveling. These problems can be solved by using a device called the white cane.

The ability to travel independently, safely, and meaningfully in various environments is the skill to be learned step by step.

The ability to move independently, safely, and purposefully through the environment is a skill of primary importance in the development of each individual. Until confronted with temporary or permanent restrictions on this ability, people seem to take for granted a skill which occupies a central place in their growth and functioning. Orientation and mobility instruction, the task of helping visually impaired people to develop or reestablish this skill, has focused increased attention on its centrality in human development.

Independent mobility facilitates full participation in formal education programs. In many occupations, mobility is essential for job performance; and almost everyone finds it necessary to be able to get to and from work. Without such competence, the number of social and recreational alternatives open to one is severely limited or can only be enjoyed at the whim or convenience of others (Foundations of Orientation and Mobility: 1987: 1).

Therefore, the significances of this research are:

1. The outcome of this research can help us understand the problems of cane using in students with visual impairment studying in Matayom 1 – 6, it can also help us find the right solution to those problems.

2. The research can give information to support the training to use the white cane in students with visual impairment, and the training on how to assist them to persons involved, i.e. teachers, friends and parents.

The Objectives of the Research

1. To determine the level of knowledge on using the white cane and attitudes towards it in the students with visual impairment in Matayom 1 – 6.

2. To investigate the relationship between the knowledge on using the white cane and the attitude towards it in the students with visual impairment in Matayom 1 – 6.

The Hypothesis of the Research

The attitudes towards using the white cane are related to the levels of knowledge the users have on this subject.

Scope of the Research

This research studies the knowledge and attitudes in using the white cane of students with visual impairment who are studying in Matayom 1 – 6 in regular schools in Bangkok. It also studies the students' performance in using the white cane while traveling from home to school and in the school campus.

Research Questions

1. What levels of knowledge on using white cane do the students with visual impairment have?

2. What levels of attitudes towards using white cane do those students have ?

3. What is the relationship between knowledge and attitude in the students with visual impairment to use the white cane?

Definitions of Specific Terms

"Knowledge level" The amount of correctly questionnaire answers, they are divided to 3 levels; high score, middle score and low score that researcher limits the score rage.

"Attitude" The respondents agree or not agree that they respond to the questionnaire about using white cane.

"Integrated Students" The students with visual impairment who are studying with their normal peers in 7 regular schools:

1. Santiraj Wittayalai
2. Samsen Wittayalai
3. Sriayuthaya
4. Wat Makutkasat
5. Shinoros Wittayalai
6. Teplila
7. Saint Gabriel

"White Cane or Long Cane" A kind of travel aides for blind people. It helps them travel safely, independently, and comfortably. There are many types of white canes coming out in different shapes and sizes and with different material, i.e. wood, metal, or plastic.

"Blind" Those who receive so little information from their vision that they have to rely on other senses. It also includes those who have to use a travel aide.

"Low Vision" Those who can somewhat rely on vision to receive information.

"Orientation and Mobility (O&M) Skills" It is the important skills that it can help persons with visual impairment live independently, productively and possibly equally to normal people.

Expected Outcomes

1. It will enable us to determine the level of knowledge and attitudes of Matayom 1 – 6 students with visual impairment have on using the white cane.

2. It will help us understand the conditions about using white cane that the students with visual impairment have, and then it will show us to adapt the environment to using it suitably for them.

3. The schools can receive beneficial information on using the white cane correctly in order to arrange the training about it.

CHAPTER 2
REVIEW OF LITERATURE

The literature related to the studies of knowledge and attitude on using white cane of the visually impaired students in the secondary schools in Bangkok was collected from documents, texts, journals, reports, as well as related researches. The content of the reviewed literature is presented in different aspects as followed:

1. Knowledge about the White Cane
2. The Approaches to the Attitude and Knowledge
3. Knowledge about Visual Impairment
4. Related Literature Review

1. Knowledge about the White Cane

1.1 Traveling with the White Cane

In 1894 the Lion Club of Illinois supported the using of the white cane for people with visual impairment. The white cane then became the identification of visual impairment. Yet, there was no training in using it.

The year 1895 was an important year, as there was a training course in Orientation and Mobility (O&M) to individuals with visual impairment at Valley Force Hospital in Philadelphia, where there were many injured veterans and those who became visually impaired from war.

Dr. Richard Hoover, the director of the Physical Therapy Unit of the hospital noticed the way the clients who had visual impairment unsystematically swung a short and heavy cane along the hospital path. He and his team then modified the cane by making it longer, smaller and lighter, yet strong. It was made of aluminum.

Dr. Hoover and his team also invented the new system of holding and swinging the cane. Instead of being held in the side, it was held in the center of the body under the belt level. This helped the cane-user explore the barriers in front before stepping forward.

In addition, Dr. Hoover and his team systemized the cane skills, which was called “foot travel”. This method was the principal foundation of present Orientation and Mobility (O&M) for people with visual impairment. Dr. Hoover therefore was named the father of white cane. And October 15th is regarded as the World White Cane Day.

In 1953 the foot travel method was modified and developed at this hospital.

In early 1960, Hoover’s method turned out satisfactory, making it acceptable among other institutes in the US, and the first Orientation and Mobility (O&M) course was conducted to train the instructors to teach the subject to adults who have visual impairment. The first two universities conducting the courses were Boston College and Western Michigan University.

The courses conducted at those two universities taught how to use the remaining senses and systematic O&M skills.

In mid to late 1960, the systematic O&M was taught to children with visual impairment.

The O&M skills were initially taught to young children with visual impairment, which included totally blind, children with low vision, and children with multiply handicaps in early childhood level.

In each lesson, the instructor has to make sure that the child develops skills and positive attitudes towards the white cane. Some children may have possessed basic skills, but others may not. Therefore, the prior skills should be reviewed so that sense perception and concepts in various aspects can be built upon. The child should also be provided with appropriate learning materials and information about things in the

environments. The child needs to learn to adjust him/herself to the environments and is able to perform independent activities. Moreover, activities of daily living should be taught so that the child can perform the routine i.e., eating, washing, brushing teeth, bathing, toileting, dressing, as well as indicating his/her needs and keeping things in places, and last but not least, manners such as table manners. Regarding O&M, traveling techniques should be included i.e., travel with sighted guide, travel with a cane, and protective techniques in familiar environments.

1.2 The Evolution of the White Cane

1. Long Cane (Rigid Cane)

The shaft of a long cane comes in one piece with different length. It is made of different materials, and is painted white except for the grip. It is usually used for long, rough travel. The materials used vary from bamboo, aslon pipe, hard aluminum, stainless steel, etc. Many blind people in Thailand use water pipe as a cane, which the author would call “the specific-purpose cane” as it is not painted white which is the universal practice. (Shown in detail: Appendix C, Figure 3)

The grip of the cane is usually made of rubber nylon or plastic as it is easy to hold and it keeps the hand warm for people in cold countries. The tip of the cane is made of the same material as the shaft or is made of hard nylon. The most updated kind has a small round wheel that can easily moves around.

Canes come in a wide variety of designs. The "standard" long cane, the aluminum alloy, rigid cane with the white and red reflecting tape, golf club grip, crook, and plastic tip is being challenged by a growing variety of design styles. Canes are now made from various materials, from metal alloys to carbon composites, from plastic to fiberglass. Most are hollow, some are solid. Canes fold, telescope, or are rigid. They come with reflecting paints or special tape that reflects light. They can be white with red tips, have greenish shafts, or gray, or all white. Some canes even have strobe lights built into the handles for night travel.

Cane tips come in a growing array of designs from the traditional two inch plastic slip-on tip, to kids mushroom tips. Some tips roll, others are smooth fixed disks. Grips come from bicycle or golf club manufacturers; some grips are plastic. Some grips have a groove for the index finger, many do not. There are canes with elastic bands to slip over wrists. Other grips have attached chain rings that can slip over wrists or serve as a loop for hanging up the cane when not in use. Some canes have crooks at the grip end to protect knuckles. Other canes (many folding) have no crooks.

There are laser canes and canes that talk. In developing nations, tree limbs still serve as easy and quick canes. The Third World stick, despite disadvantages when compared with light weight alloy canes, is still capable of delivering the twenty one roles of the miracle cane. The cane is a tool. The design that a blind individual chooses depends upon personal style, utility, mood, and taste.

The cane has stood the test of time, even though fancy electronic devices have been developed as a better alternate. Electronic travel aids (ETA's) cost on the average about $2,000. ETA's do have some advantages, but compared to the long cane they still have a long way to go. Electronic gadgets inevitably pull some attention from the sense of hearing. There are beeps and hums to monitor and interpret. As important as electronic travel aids are to the competent blind traveler, they are in many ways inferior to the long cane. The cane is cheaper, easier to manufacture, easier to repair or replace, easy to store, easy to care for, and requires very little formal training to master. There is also no law that says to yield the right of way to a Mowat Sensor, and Pathsounders haven't caught on as symbols of independence. The long cane is unaffected by winter storms, drizzle, bitter cold or unbearable heat. It keeps on ticking long after all the other miracle devices have melted down or surrendered.

Presently, a variety of innovations have been made to adapting the long cane to satisfy the users. Some companies in Canada, Japan, and China have installed the sound signals, flashing light, or blinking light on the head of the long cane to help the user while walking. In Japan, the automatic light is used. A company in Taiwan has obtained a patent license for the talking cane, which can identify by speech the

obstacles in the radius of 5 foot, In case when the tip of the cane does not touch the ground for a certain period of time, the user will be instructed to lift the cane. And afterwards, if the tip still does not touch the ground, the SOS sound will come out to help the user locate the cane. Moreover, some researchers have installed radar system at the upper part of the cane in order to provide warning sound before the users bump into the obstacles on the way. The radar can also be removed when it is not necessary.

In Japan and Sweden, the cane with a magnet at the tip was invented for the travel on the paths that have the magnetic-induced objects. The magnetic effect will cause vibration to help blind people walk straight.

2. Collapsible Cane (Folding Cane, Telescopic cane)

It is easy to be carried around. The materials used are similar to those of the long cane, only that they should be durable and light i.e. fiberglass and carbon fiber. There are more types of the collapsible canes than those of the long canes. The designs of the collapsible canes include 4 pieces and 6 pieces, bound together with 1 or 2 elastic bands. The user unfolds the cane, let the cane down, pull the binding elastic tight, and each piece of the cane will automatically fit in one another.
(Shown in detail: Appendix C, Figure 4)

The telescopic cane works by pulling out and pushing in the pieces of the cane. Each piece has a hole to fix the spring lock in. It is not very sturdy, suitable for using in an office or in a cinema. (Shown in detail: Appendix C, Figure 5)

Another modification adopts the telescopic system but without locks. It works by pulling the pieces of the cane all the way to the end, and twisting the pieces tight. It is kept by shoving it lightly,

Another modification looks like a microphone stand. To use it, pull out the pieces and wind up the screw.

All of these types of canes have reflective lamination or have reflective wrap to make them easily seen. A laser beam has currently installed at the head of the cane in order to identify the barriers in 3 directions, namely, upward, downward, and around the traveler.

1.3 The Approaches to the Travel of Visual Impairment

Suwimon Udompiriyasak (1994: 2–4) stated that Orientation and Mobility enhances self-confidence and promotes life-long independence for individuals with visual impairment. It also helps them live a normal life in the society.

According to Montien Boontan (Montien Boontan 1999: 8), in order for an individual with visual impairment to achieve a normal and independent life as a member of the society, he/she needs to posses the following skills:

1. Independent travel skills
2. Braille literacy in both Thai and English
3. Typing and basic computer literacy
4. Independent living skills
5. Social skill and self-confidence

Lowenfield (1981 cited in Suwimon Udompiriyasak 1994) stated that the mobility skills consist of 2 major components:

1. Familiarity with the environment
2. The ability to recognize surrounding places and the ability to move from one place to another independently and purposefully. The integration of these skills is Orientation and Mobility (O&M).

Some definitions of Orientation and Mobility include:

Hill & Ponder (1980 cited in Suwimon Udompiriyasak 1994: 1) defined Orientation and Mobility as a process in which people with visual impairment use various senses to get familiar with the surrounding environments and move in the environments in every situation. The process of O&M training, the trainee needs to

combine sensory integration, a basic requirement in O&M training, with environments familiarity while moving to the destination. The independent traveling skills to be developed are mobility, alignment, en routing, and posturing.

Welsh & Blasch (1987 cited in Suwimon Udompiriyasak 1994) stated that people with visual impairment need to develop Orientation and Mobility skills so that they can move safely, independently and purposefully in the environments.

Welsch (1987 cited in Suwimon Udompiriyasak 1994: 2) stated that in addition to the basic required knowledge, the level of physical and mental readiness plays an important role as physical, emotional and mental conditions have an impact on grasping abstract concepts. The level of concentration, attention span, and frustration has a great impact on O&M training.

Hanks Levy (Webster 1978 cited in Suwimon Udompiriyasak 1994: 2) stated that according to the pioneers in the field of O&M, O&M training should be included in the educational curriculum for children with visual impairment. Once the skills are mastered, the greatest power is endowed to individuals with visual impairment to fight with obstacles in the environment.

In the US, the O&M instructors must be certified by the specialists from the Association for Education and Rehabilitation of the Blind and Visually-Impaired (AER), who determine the basic requirements for O&M instructors. Every five years, the O&M instructors are required to display their teaching performance and attend a required training course for a certain number of hours. Some states set such additional requirements as experiences with integrated students, attending a university course, or passing the required test. The instructors must also develop IEP’s that put emphasis on building confidence, independent travel, responsibilities, and acceptance to self-decision.

When conducting a training in the community, the instructor should be ensured that the client posses the ability to travel and the readiness for self- development. In

case of inconvenient routes, the instructor can choose other similar places for the training. The training process begins with travel with a sighted guide and how to appropriately request assistance. The experiences obtained will vary from situations to situations. The clients will learn different experiences from different situations. These will enable the clients to develop the necessary problem-solving skills to be used when veering, and to go to familiar places independently.

The most difficult thing in teaching O&M skills is about the memory. If the client has problems in performing daily routines, how can he/she learn O&M skills? It is hard and time-consuming. The O&M training requires the combination of skills. For instance, in the two-point touch training, the client needs to work on swinging the cane along with the pacing. When teaching, the instructor should ask the clients the questions about O&M skills and notice the client's mistakes. The O&M skills are related to muscle skills and thinking skills. The combination of these skills enables the cane-user to go to any place. The instruction can control safety and the client can learn further travel techniques.

Concerning the O&M training in Thailand, in 1984 Christofel Blinden Mission (CBM), an organization in German, in cooperation with the Division of Special Education, under the Department of General Education, Ministry of Education, organized the first O&M training course. It was a 100-daycourse during April 9th – July 9th, 1984. The course director was Mr. Thomas J. Blair.Two of his former students, Mr. Chalam Yam-iam and Mr. Direk Mukajit. Were his assistants in this course.

There were 13 training participants, namely:

1. Somboon Charktin
2. Suwit Laowongkote
3. Somchai Yam-iam
4. Prapan Pimman
5. Piyasak Boonkla
6. Pimpan Yam-iam
7. Painee Sumranveth

8. Aree Pleonchaiwanich
9. La-iad Kaysornjarung
10. Payao Sribua
11. Pichaya (the surname unknown)
12. Prasert (the surname unknown)
13. Jiamjit (the surname unknown)

Presently, only two of these participants, namely, Somchai Yam-iam and Piyasak Boonkla, are still teaching O&M to clients with visual impairment. One of the course assistants, Chalam Yam-iam is presently an O&M specialist conducting training courses to those who work with people with visual impairment as well as working directly with the clients with visual impairment themselves.

The consequence from this first training course was the introduction of O&M to the institutions and the agencies working with people with visual impairment. Many similar training courses have been conducted to provide O&M training to those who work with people with visual impairment. These training courses followed the model of Mr. Thomas J. Blair. He is therefore entitled “Father of O&M in Thailand.”

Chalam Yam-iam (1988 cited in Nuchanart Toadee 2001: 12) summarized the travel methods used by individuals with visual impairment as followed:

1. Travel with sighted guide
2. Travel with dog guide
3. Travel with white cane
4. Travel with electronic aides

In Thailand, the O&M trainings emphasize on travel with a sighted guide and travel with the white cane since these two methods work best with the economic, social, and geographical conditions of the country. As for the method of travel with dog guide and travel with electronic aide, there has not been any specific training in these two methods due to the incompatibility.

Suwimon Udompiriyasak (1994: 4) summarized the safe travel methods for people with visual impairment as followed:

1. Travel with sighted guide
2. Travel with dog guide
3. Independent travel with white cane
4. Independent Travel in familiar places without guide nor white cane

Each method has its principle and methodology. It is therefore necessary for individuals with visual impairment to learn each of these techniques. After all, the ultimate goal of O&M training is to help individuals get access to familiar and unfamiliar environments safely, independently, and gracefully as much as possible.

1.4 The White Cane Methodology

The Ministry of Public Health (1992: 26 – 27) suggested the principles of training mobility and independent traveling with cane for individuals with visual impairments as followed:

1. The cane must be straight, sturdy, and not too heavy, with appropriate length.
2. The tip of the cane should be at the distance of 1 meter from the user's body.
3. The cane can be held in left or right hand. The thumb is positioned over and around the grip. The index finger is extended along the side of the grip. And the remaining fingers flex around the bottom of the grip. The index finger provides good kinesthetic awareness of the position of the tip.
4. The arm should be flexibly stretched forward. The wrist should be at the mid line which facilitates straight line travel
5. Swing the cane from side to side. Keep the tip close to the ground.
6. Swing the cane with the wrist not the arm. Keep equal extension on either side of the body.
7. Swing the cane to make the tip touch the ground beyond each side of the body so that the tip can detect the ground in front. This can protect the cane user from ditches, holes, and obstacles. The shaft of the cane can also protect the lower part of the user's body.

8. While swinging the cane to the right, the left foot should step forward, and vice versa. The cane tip must always explore the ground before the foot. (Shown in detail: Appendix C: Figure 6, 7)

2. The Approaches to Attitudes and Knowledge

2.1 Definition of attitudes

Attitude is a common word in the field of Social Psychology. It derives from a Latin word “Aptus”, which means tendency. Attitude is an abstract noun used to describe many behaviors. It has many definitions.

Sucha Chanaim (1993: 242) defined attitude as one’s feeling towards persons, things, or situations in terms of satisfaction or non-satisfaction, agreement or dis-agreement.

Pantip Siriwanbutr (1997: 38) defined attitude as the meaning one creates about objects, people, animals, concepts, and conditions, instilled in one’s mind as a result of one’s learning and experiences that influence one’s thinking and action in the society.

Attitude plays a important role in the society. Good attitudes towards objects, people, or situations help people live in harmony.

2.2 Characteristics of Attitudes

Chudapa Punyahitanont (1998: 31) summarized the characteristics of attitudes that have impact on communication as followed:

1. Direction

Direction includes agreement, disagreement, and being neutral. In communication, the knowledge and the attitudes of the message-sender and the message-receiver determine the effectiveness of the communication

2. Intensity

Knowing the tendency of the receiver's attitudes can predict the possibility of success in persuasion.

3. Salience

Salience means the receiver's perception of the importance of the attitude

4. Differentiation

Attitudes can be varied depending on the degree of differentiation of the supporting sub-attitudes.

2.3 The Role of Attitude

Daniel Katz (cited in Chudapa Punyahitanont 1998: 32) summarized the roles of the attitude as followed:

1. Adjustment Utility: Based on reward and punishment. When we prefer to respond to our needs
2. Ego Defense: Protect the person from threats or internal feelings. When attitude is developed to cover insecure feeling.
3. Value Expression: Goes to the consumer's central values or self-concept. When attitude is developed to show belief or values.
4. Knowledge: The need for order, meaning, and structure. When attitude is used to help understand the whole picture of environment.

2.4 The Formation of Attitude

Alport (cited in Chudapa Punyahitanono 1998: 32) mentioned about formation of attitudes as follows.

1. Attitude is formed by learning. A child directly or indirectly learns about culture and tradition from his/her parents' attitudes and their practice.
2. Attitude is formed by the abilities to differentiate rightness and wrongness.
3. Attitude is formed by one's experiences. For instance, a child develops bad attitudes when being blamed by the teacher. On the other hand, another child develops good attitudes towards that teacher since the teacher always praises him/her.

4. Attitude is formed by imitation. For instance, a child may transfer the attitude from the parents or the teachers he/she admires.

Tawil Tarapoch (1983: 65 – 67 cited in Pajongrak Sotsiri 2000: 18 – 19) stated that attitudes are formed by the upbringing, the influence of the media, impressive events, achievement, motivation, etc. Attitudes are adventitiously acquired and depend on:

1. Specific Experience. For instance, we develop good attitudes towards the person who rewards us, but may develop bad attitudes towards the person who punishes or frustrates us.

2. Communication from others. When we communicate with others in daily life, we automatically accept attitudes from them. This kind of communication is non-formal and would occur with family members, relatives, or acquaintances. For instances, the child who was frequently taught not to abuse animals can develop this attitude. The media that have influences over people's attitudes include television, radio, newspaper, book, and journal. The reporters sometime may have bias, i.e., parents get bad attitude towards teenagers from the negative report of the media.

3. Model. A person can form an attitude by observing the behaviors of other people and following those behaviors. The intensity of the attitude depends on the degree of acceptance on has in the role model.

4. Institutional factor. It includes family, school, temple, organization. These institutions take significant parts in formation of attitudes within individuals. For example, schools are places from which individuals' knowledge and attitude have developed for good conducts. This convinces the public of having a good knowledge school in the community to help develop and abilities for its members.

Teerapol Suwanno (1978: 1 – 17 cited in Pajonglak Sotsiri 1999: 40) divided the influences of attitudes in 4 aspects as followed:

1. Influence from parents. Parents are the greatest influences for the child, especially at pre-school age. The child can develop value, belief, feeling and thinking according to the frame of the family, in which parents play a principal role.

2. Influences from school. They are friends and teachers.

3. Influences from personal experiences. Childhood experiences have a great impact on a person's development and attitudes. Violent or devastating experiences will stay on in one's mind and affect one's attitudes.

4. Influences from the mass media. The mass media include radio, television, movie, newspaper, magazine. The most outstanding case is advertisement, which is aimed to influence people's attitudes. Mass Media therefore have the greatest influences over people attitudes, particularly when the receivers are unaware of the subject.

These factors, namely, parents, schools, personal experiences, and media have influences over the formation and alternation of people's attitudes.

2.5 The Benefits of Attitudes

Sasitorn Nantiyanont (1994: 11 – 12) summarized the benefits of attitudes as followed:

1. It promotes the understanding of things around us by categorizing or systematizing them.

2. It enhances self-esteem by making people avoid bad things or cover unpleasant truth.

3. It facilitates adjustment to complex environments. Normally, people's response or reaction depends on the reward or the satisfaction they will receive from the environments.

In brief, attitude helps people display their value, which brings satisfaction to them (Prapapen Suworn 1983 cited in Sasitorn Nantiyanont 1994)

2.6 The Relationship between Attitudes and Behaviors

Attitudes and behaviors are related and have impact on each other. In other words, attitudes induce persons' feeling and the way the one person treats the other person or how the person acts in a situation. People's behaviors and actions are derived from the attitudes and the norms of the society. Attitudes are regarded as the variables lying between receptions and responses to messages or stimuli (Kanitta Benjatikul 1989: cited in Chudapa Punyahitanont 1998 33: 34).

Regarding the alternation of attitudes and behaviors, there are many related approaches and theories on the subject. The alternation of attitudes depends on the knowledge and the understanding. That is, the knowledge and the understanding can change attitudes and the changed attitudes can change the behaviors. These three variables are therefore connected together (Zimba, Philip G., Ebbe B. Ebbeson, & Christina Moslach 1997 cited in Chudapa Punyahitanont 1998: 34).

Chalongrat Piromrat 1978 cited in Pajonglak Sotesiri 1999: 23 – 24) proposed that attitudes are significant to the way people live in the society as attitudes can incur peace or chaos in the society. For example, if everyone in a society has good attitudes towards one another, the society will likely to be free of troubles. This is because attitudes can stimulate behaviors of avoidance or pursuit.

Psychologists believe that attitudes determine the direction of the behaviors but not the time to display the behaviors or the quantity of the behaviors. Time and quantity will be determined by the motivation, For example, when one is hungry, one eats. How much one eats is driven by how hungry one is. Hunger therefore acts as a motivation.

In brief, attitude is the emotion and feeling that induces the behavior or a certain action to people, things, situations in either positive or negative way. Understanding a person's attitudes helps predicting his/her behaviors or actions. Attitudes determine performances.

2.7 The Importance of the Measuring of the Attitudes

Sasitorn Nantiyanont 1994: 10 – 11) stated that measuring the attitudes people have towards people, things, or situations is beneficial to the people and the society in the following aspects:

1. Measuring attitudes to predict behaviors.

We can know if people have much or little, positive or negative knowledge about certain things by measuring their attitudes. Knowing their attitudes can help predict their behaviors. The ability to predict is one of needs of people and societies as it helps them know how to appropriately behave or act to others or particular situations. It may also help control people's behaviors.

2. Measuring attitudes to understand the cause and the effect.

Attitudes are the inner drives that induce people's behaviors. Attitudes are partly formed by external causes. Attitudes can act as a filter or distorter from the influence of the external causes. It is beneficial to understanding the external causes that have influences over people's action. For example, to get the solution if a strict upbringing can make a child depressed; studying from only the behaviors and the external causes may not be able to give a clear picture. But if the attitudes of the child towards the strict upbringing are examined, it may turn out that the strict upbringing may affect the child who does not like it, but cannot affect the child who does.

3. Measuring attitudes for a protective purpose.

People have the rights to instill their own attitudes towards surrounding things. However, a peaceful society needs to have people with accord attitudes to promote collaboration and prevent rifts. Some jobs require people with positive attitudes towards the job to work in. For examples, researchers need to have good attitudes towards researching. On the contrary, if teachers have poor attitudes towards teaching, it will certainly affect the students, the schools, and the nation as a whole. Therefore, it is necessary to evaluate the attitudes towards teaching professionalism among the candidates applying for the posts.

4. Measuring attitudes for a remedial purpose.

In a democratic society, people can have widely different attitudes. But in some case, the accordance of attitudes is essential for the well being of the society as it causes unity. For example, keeping the streets and the houses clean for the well being of the society. Measuring the people's attitudes helps the authority know if a certain group of people have the attitudes that support the policy imposed which requires collaboration form the people. Therefore, measuring the attitudes helps the authority know about the attitudes of the people in order to instill positive attitudes to the people for the benefits of the nation.

2.8 The Methods of Measuring Attitudes

Chudapa Punyahitanont (1998: 34 – 35) summarized the methods of measuring attitudes as followed:

1. Scaling Technique

It is one of methods used to measure attitudes. There are 2 types:

1.1 The Therstone Method

It consists of 10-20 different statements or more. These statements represent the rating levels of different opinions. The respondents are to display their agreement or disagreement about each of these statements. Each statement has its own scaling value. The scale menu starts with 0.0 which mean extreme unsatisfactory, 5.5 is for neutral statements, and up to 11.00 which means extreme satisfactory.

1.2 The Likert Technique.

It consists of different statements. The respondents display their opinions in 5 scales, namely, extremely disagree, disagree, neutral, agree, and extremely agree. The scale of 1-5 is put to each of these opinion levels. The total score of each respondent comes from the sum of the scores from all statements.

2. Polling.

It is generally used in politics or in the matter concerning people's opinions on a particular subject. For examples, disarmament, party election. The reliability of the poll depends on sampling method, subjects, and the representative value of the samples.

3. Questionnaire.

It has 2 types of questions:

3.1 Fixed Alternative Question. This is a specific question on a particular item. The number of choices provided can vary.

3.2 Open-Ended Question.

This type of question allows the respondents' freedom to state their additional opinions. These opinions are to be categorized to know the opinions of the majority.

2.9 Definition of Knowledge

Bloom (1971: 271) stated that knowledge concerns recalling something specific and universal. This includes recalling methods and processes, forms and situations, emphasizing on structures, environments, knowledge, and objectives in the

aspects of psychological process of necessity and the connective process to set new system.

Prapa Pernsuwan (1977: 10) stated that knowledge is the early–staged behavior which the learner memorizes by recalling, seeing, hearing, or recognition. This type of knowledge includes definitions, meanings, facts, theories, principles, structures, and the methods for solving problems,

2.10 Levels of knowledge

Bloom et al. (Sawai Liamkaew, 1998: 12 cited in Tanee Pokatrap, 2003: 10) proposed that the knowledge in the aspect of memory and thinking or cognitive domain consists of 6 levels of knowledge as shown from low to high level in the diagram below.

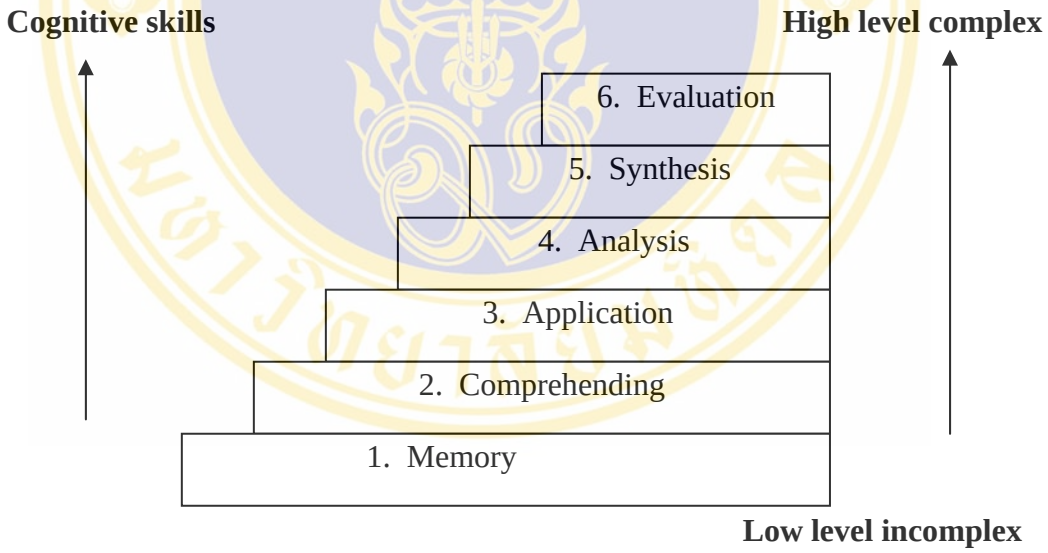

Figure 1: Diagram 1: Level of Knowledge in the aspect of the cognitive domain according to Bloom et al. (Sawai Liamkeaw, 1985: 119 cited in Tanee Pokatrap, 2003: 10)

According to the diagram, memory is the basic knowledge. Without memory, comprehension will not occur. Likewise, application will not occur without comprehension. The steps will go on this way from level 1 to level 6. These are called cognitive skills.

Bloom et al. (1959) created this structure to lay a foundation of the educational curriculum, which should cover the 6 following levels:

1. Memory

Memory is an essential part in a cognitive process. Memory has an impact on awareness, knowing, learning, language using, conceptualizing, problem solving and decision. Memory means restoring information for a period of time (Lachman & Butterfield 1979 cited in Yothin Sansanayuth et al. 1990: 99). The period can be less than one second or can last a lifetime.

2. Comprehension

Comprehension is the cognitive ability to reasonably expand memory.

3. Application

Application means the ability to transfer knowledge and memory to problem solving in new situations by integrating specific knowledge, concepts and the ability to interpret as show in diagram.

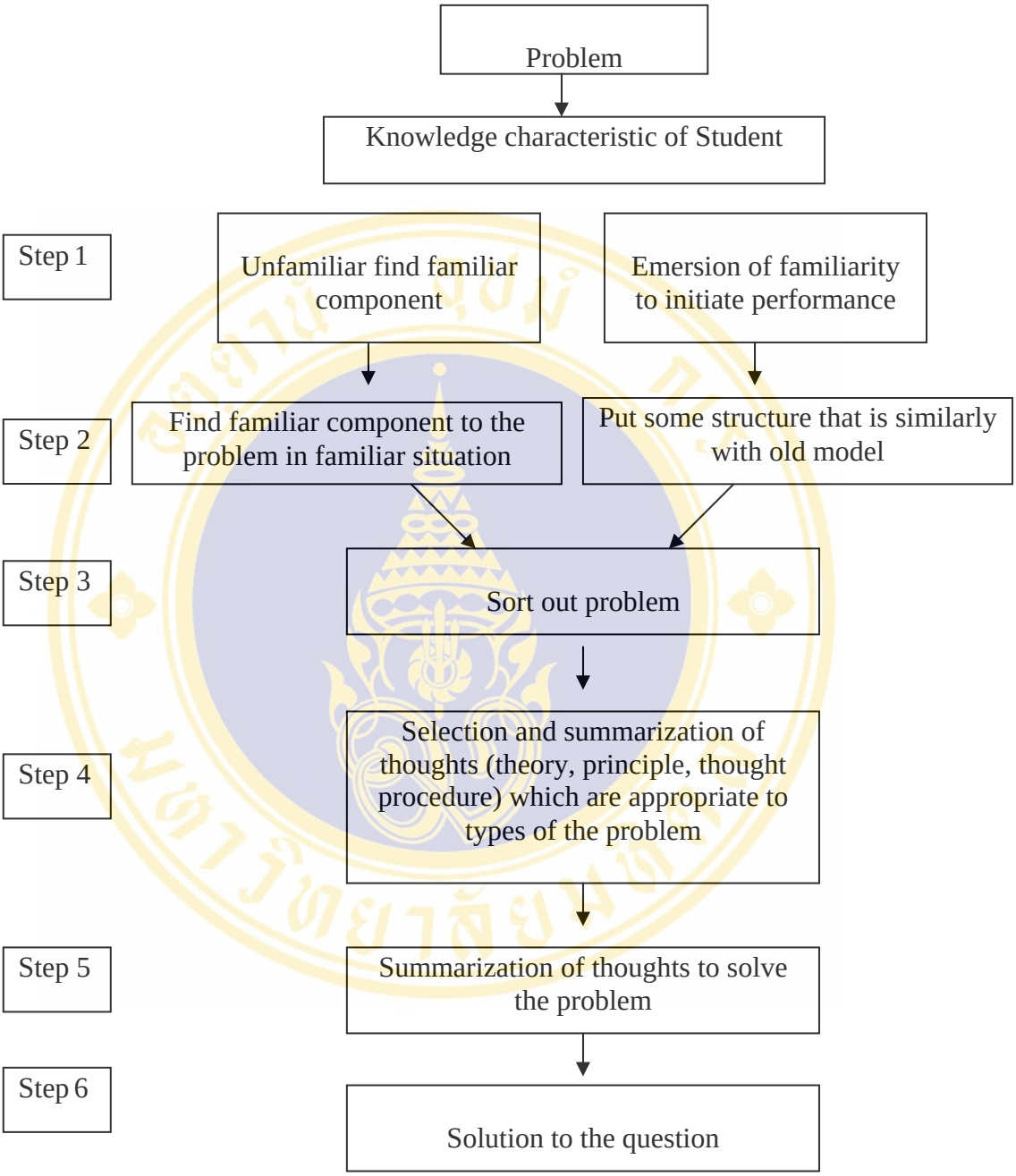

Figure 2: Diagram 2: Process of 'Application' (Tawutchai Chaijirachayaikul, 1984: 50 cited in Tanee Pokatrap, 2003: 12)

4. Analysis

Analysis is a more advanced ability and skill than comprehension and application. It comprises breaking down the content into relative parts as well as

finding relationship between parts of the whole. It is a tool to enhance true understanding of various things and can also be an introduction to evaluation.

5. Synthesis

Synthesis is the ability to put various things together as a whole. It is the process of putting together the content and substance to create a new pattern of structure. This process requires creativity within the provided scope.

6. Evaluation

Evaluation is the ability to make judgment over the values, thoughts, performances, methods, and contents to serve a specific purpose. Evaluation includes determining the criteria as the basis for making judgment. It is the highest level of cognitive domain and requires the combination of knowledge, comprehension, application, analysis, and synthesis.

2.11 Measuring the Knowledge

There are many tools to measure knowledge. Each tool has different characteristics. The most widely-used tool is a test. It is a tool to measure knowledge and memory installed in a human's brain (Raviwan Chanatrakul 1993: 86).

There are 2 types of test:

1. Essay Type
2. Multiple-Choice Type

As for this research, the researcher used the multiple-choice test with 4 choices, since it is appropriate to the data collection method and timing as well as the validity in measuring knowledge.

3. Knowledge about Visual Impairment

3.1 Definition of Visual Impairment

Chalam Yam-iam (1979: 1 – 2 cited in Wassana Plengsombat 1999: 17 – 18) defined the term as:

1. In general, an individual with visual impairment means the individual who has no vision or has some vision but cannot perform visual tasks as well as normal people.

2. In an educational aspect, an individual with visual impairment means the individual who cannot primarily learn by vision. He/She has to primarily learn by other senses by using ears, hands, skin, or muscles.

3. From a medical aspect, in America an individual whose vision functioning is less than 10 percent, when judging from distance and visual field, is entitled blind.

4. In a legal aspect, in many countries the legally blind means an individual whose vision in the better eye after correction is less than 20/200 or has vision field less than 20 degree. (Normal people have visual field of 180 degree.)

5. In a vocational aspect, an individual with visual impairment means the individual whose impaired vision gives difficulties in performing some work, or hinders him/her from certain jobs. For instances, driving, jobs requiring color discrimination or reading and writing print, or jobs that require extensive use of vision such as cutting gems, constructional design, or decoration. Many factories do not hire the workers whose vision is less than 20/200 or 6/60.

As far as the military recruitment is concern, in Thailand those who are color-blind or whose vision is less than 20/80 foot or 6/24 meter are not eligible for recruitment.

Chuchep Ornkokesueng (1984: 111) defined individuals with visual impairment as followed:

1. In a legal aspect, an individual with visual impairment means the individual, due to the visual impairment, has to come closer at the distance of 20 feet to see the object that normal people can see at the distance of 200 feet.

2. In an educational aspect, an individual with visual impairment means the individual who needs to use Braille as the only media for reading.

From the above definition, the vision problems can be divided into 2 categories:

1. Low vision includes the range of vision from 20/70 to 20/200 in the better eye after correction.

2. Blind means having no vision at all.

The Rehabilitation for the Disabled Act (1991) defines an individual with visual impairment as an individual whose vision in the better eye after best correction is less than 6/18 or 20/70 down to no light perception, or an individual whose visual field is less than 30 degree.

The Ministry of Education (2000: 27 – 30) defines an individual with visual impairment as the individual who has some degree of vision loss from mild loss to total blindness. There are 2 categories of visual impairment:

1. Blind means those whose vision loss is so severe that they need to use braille or sound media. Their vision acuity in better eye after correction is 6/60 or 20/200 down to no light perception. (Visual acuity of 6/60 or 20/200 means the person with vision impairment has to come closer to the distance of 6 feet or 20 meter to be able to see the object people with normal vision can see at the distance of 60 feet or 200 meters). An individual with visual impairment also includes the one whose visual field is less than 20 degree. (He/She can see narrower than 20 degree).

2. The low vision means those who have some vision loss, but are able to read large print or normal print by using magnifiers. Their visual acuity after correction is between 6/18 or 20/70 down to 6/60 or 20/200, or have visual field less than 30 degree.

3.2 The Causes of Visual Impairment

Natenapa Anuprasertt (1999: 22 – 24) summarized the causes of visual impairments as followed:

1. Heredity

Many eye diseases and disorders are caused by heredity. For examples, myopia or shortsightedness and imbalanced eye muscles. Other causes are chromosome disorders, which affect the genes as well as recessive and dominant traits according to the law of heredity.

2. Diseases during Pregnancy

The first three months of pregnancy is very crucial.

The diseases from the pregnant mother are easily transmitted to the child. One of these diseases includes Rubella. The infant who transmits this disease from the

thither will have small eyeballs or even have no eyeballs, or develop glaucoma or cataract, which cause imbalance eye muscles. Some pregnant mothers have fungi in the blood vessels and transmit the fungi to the child. This causes inflammation of the optic nerve, which can lead to visual loss. Syphilis is another disease that can be transmitted from the pregnant mother to the child, which leads to blur vision or blindness.

3. Premature birth

Premature infants need to be put in an incubator and are at risk of receiving too much oxygen that can damage the retina.

4. Eye Disease

Some severe eye diseases can cause blindness if not correctly treated.

The diseases of the eye can be summarized as followed:

4.1 Acute Glaucoma

Some diseases in the eyes i.e., tumor or hemorrhage can increase ocular pressure and clog small blood vessels in the eyes. In some cases, glaucoma can be developed from cataract, which swells outwards causing eyeballs to pop out and develop glaucoma. Long use of steroid and the condition of excessive fluid in the eyeball are other causes of glaucoma. The patients will have a headache and nausea. The blood vessels in the white eye, especially around the cornea grow, causing red eyes and white membrane around the cornea, enlarged pupils. If not properly treated, it can lead to blindness.

4.2 Inflammation of Iris

This can occur to individuals of all ages causing blur vision, some pain in the eyes particularly in sunlight, and red eyes.

4.3 Inflammation of cornea or Scar on the cornea

Small particles or foreign bodies in the eyes can cause scars on the cornea. The patients will have blur vision, pain, red eyes, excessive mucus and tears.

4.4 Severe Infection

The patients will have excessive yellowish mucus, swelling eyelids, and red eyes. It can lead to blindness if not treated.

4.5 Diseases of the retina

Retina sends impulses from the eyes to the brain. The brain then interprets the signals into pictures. Retina diseases can easily cause blindness. The most common retina diseases are swelling retina, infection of retina, degeneration of retina, and detachment of retina.

4.6 Cataract

It is the condition of opacity of the lens, and can be found in people of all ages, depending on the causes. Cataract causes no pain, except when it develops to glaucoma, which leads to blur vision and possibly blindness.

4.7 Chronic Glaucoma

It is a dangerous disease as the ocular pressure gradually increases without any symptoms. The high ocular pressure will damage the retina, causing gradual visual loss, restricted visual field, and blindness. Other eye diseases include eye infection on, and eye cancer. If not properly treated, these diseases will lead to blindness.

5. Accidents

An accident can damage or defect some parts of the eye and can cause blindness.

6. Lack of vitamin A

It is the cause of blindness mostly found in children, especially those who do not have breast-feeding, or those who are fed with low quality milk. They will develop scars on the conjunctiva. In serous cases, the cornea will soggy and get infection. Children who have this disease will be unable to see in the dim light and can be finally blind.

7. Other causes include allergy, eye inflammations from chemical substances, toxic, or ray, fungi, mental illness, worms, etc.

3.3 Characteristics of the blind

Wasana Plengsombat (1999: 22) described visual impairment as physically obvious. The impairments of the eyes include closed eyelids, sunken eyeballs, popping eyeballs, and crystal-like prosthetic eyeballs.

The lost of eyesight or eyeballs which are extremely important have impact on the characteristics of the blind in the following aspects:

1. Manner and Movement

Individuals with visual impairment may have strange manner and movement. They wear black sunglasses, and carry a white cane. They walk slower, with hesitation, lack confidence, and need to use their hands on explore the environments.

2. Sensory Perceptions

The blind lose visual sense, which is the most important sense of human beings. They therefore must make the most use of other senses, namely, hearing, touching, smelling and tasting. It was found that the ability of the blind to judge distance is as good as or even better than that of the normal people. So are sound discrimination, shape and size discrimination form touch, air pressure, temperature, and odor. These abilities help them able to play musical instruments and perform sport activities, i.e., ping-pong and football. The bells are put in the ball so that the blind can know were the ball is going.

3. The blind with no hearing impairment can use language as a communication tool like normal people. The blind do not stutter but almost 5 percent of them have more language problems than their normal peers. The congenitally blind usually have some delay in language development. They tend to speak at slower pace, but loudly and sometimes not very clearly. They have limited vocabulary and less non-verbal language than normal people.

4. Adjustment

Like normal people, the blind can adjust themselves to be fit in. The congenitally blind are usually well adjusted, not feeling sorry for their disability, but many feel immature, insecure, and lack self -confidence. Some develop the habits of shaking their heads or their hands meaninglessly, rubbing their eyes, or sitting stiffly. These manners may come from emotional problems. However, these manners will gradually disappear when the blind child grows up.

5. Intelligence

The IQ levels of blind children do not differ from their normal peer. Visual impairment alone does not cause intelligent impairment. Some blind students at the Bangkok School for the Blind can study in bachelor or master degree level locally and abroad.

6. Perception

The blind have better perception than normal people. Those who became blind after 5 years old will have no visual memory.

7. Academic Achievement

Blind students usually have less achievement in mathematics. However, in general, the integrated blind students are 2 years older than their sighted classmates. This is because they tend to start their schooling late as the result of eye treatment or speech remedy or the difficulty in finding the appropriate school.

25 – 35 percent of school-aged children have visual problems, but the problems are not so severe that they need special education. On the contrary, children with visual impairment need such special education programs as mobility training, independent travel skills, cane skills, and braille skills. Braille letters are embossed dots read by touch (Sompong Phansuban 1986: 16–19 cited in Wassana PlengSombat 1999: 24)

4. Relate Literature Review

Novie, Gregory John. (1985). This study is Stereotypes and Memory for Person Information .The effects of using different language in describing a person as visually disabled in the context of forming an impression of the person were investigated. The language was either a general stereotypic label "blind" or a more specific, individuating description "has many characteristics, among them are that he has visual limitations and uses a white cane." Of specific interest were the effects of the descriptions on the amount and type of additional information recalled about the person in an incidental, free-recall task. Also investigated were the effects of presenting the descriptions either before or after additional information about the person on both the amount and type of information recalled. A third variable was the nature of the additional information which was in the form of 28 behaviors and was selected based on favorability and consistency with the stereotype "blind person." Seventy-five college student subjects were randomly assigned to one of five description conditions. Subjects were told they would read about a "blind person" or "a person who has many characteristics, among them are that he has visual limitations and uses a white cane" either before or after 30 behaviors describing the person. A

fifth group served as a control, receiving no information about disability. Dependent measures were immediate free recall and ratings on evaluative personality dimensions. Descriptive conditions had no differential effects on either the amount or type of information recalled. For all subjects, favorability and stereotype-inconsistency interacted to make information more memorable. Describing a visual disability in general terms compared to more specific either before or after information about a person made no difference in subsequent personality trait ratings.

White, Keith Douglas. (1987). This study examined the performance of the two-point touch long cane technique demonstrated by experienced long cane users (participants with visual impairments), instructors in long cane techniques (orientation and mobility instructors), and sighted participants naïve to long cane use. Participants' movements while wielding a long cane were recorded using a sophisticated motion analysis system. Participants were asked to use the long cane in four conditions: as they would normally, exhibiting perfect two-point touch technique, moving comfortably while maintaining adequate safety, and once again exhibiting perfect technique. The sighted participants also went through a series of training sessions and had their movement patterns recorded before and after each training session. Results indicated that experienced long cane users and instructors used the cane in similar ways. The sighted participants were equitable with the other two groups after a very short period of training. However, all groups diverged from perfect technique performance by moving their hands to the right of midline and using cane tip arcs much larger than those prescribed by orientation and mobility texts. Analysis of biomechanical aspects of long cane technique performance indicate that the two main measures of performance (body coverage and step-to-cane rhythm) are not associated with each. Each of these two outcome measures appears to be linked with separate groups of biomechanical features. This indicates that there are at least two distinct processes involved in performance of the two-point touch technique. One implication of this finding is that the measure of body coverage is more appropriate for determining effectiveness of long cane use than step-to-cane rhythm.

Pogrund, R. L. and Rosen, S. J. (1989). This article proposes the teaching of long cane mobility skills to blind preschool-age children. Traditional arguments against early cane use are refuted and possible advantages of early use identified. Strategies and techniques for cane introduction are specified.

Rodgers, Mark David. (1991). Study is A Human Factors Analysis of The Long cane. Eleven experiments were conducted to assess the effect of several cane variables on the performance of long cane users. Three experiments dealt with the effect of weight. Performance deteriorated linearly as cane weight was increased, but the distribution of the cane shaft's weight did not have a significant effect on the accuracy of cane manipulation, and weight did not have a significant effect on the discrimination of surface characteristics. The results of Study 4 indicated that increasing the rigidity of the cane shaft resulted in a large and significant improvement in discrimination. The results of Study 5 indicated that the effect of cane length on the ability to negotiate steps down was significant. The susceptibility of several differently shaped cane tips to hang-ups was investigated in Studies 6 and 7. In Study 6, three currently used tips and two tips of new design were compared. One of the new designs and the NFB tip were clearly superior. In Study 7, a composite tip, incorporating the characteristics of the two best tips tested in Study 6, was designed. This tip and the two tips on which its design was based were compared. The composite tip was involved in significantly fewer hang-ups than the other two tips. In the eighth study, the acoustic content of the sounds made by five cane tips when they struck a hard surface was assessed. Large differences were found, but their effect on performance has not yet been determined. The results of Study 9 indicated that the response of several different cane shafts to induced vibration, varied significantly as a function of both weight and flexibility. In Study 10, the resistance of several cane shafts to stress was measured. In the final experiment, a cane whose design was guided by the results of the preceding 10 experiments, and the Typhlocane, a long cane of conventional design, were compared. When subjects used the new cane, they walked significantly faster, and experienced significantly fewer hang-ups than when they used the Typhlocane. They also rated the new cane superior to the Typhlocane in comfort and ability to provide useful information.

Clarke, Kay Lorraine. (1992). This study is A Comparison of The effects of Mobility Training white A long Cane and A Precane Device on The Travel Performance of Preschool Children with Service Visual disabilities. This study was conducted to compare the ability of preschool children with severe visual disabilities to learn to use two different mobility devices, the long cane and a precane device, and to measure the effects of the two devices on selected aspects of the children's travel performance. Measures of body contact with obstacles, speed of travel, and appropriateness of device use were taken each session for the four participating children, aged 59 or 66 months. Verbal and physical prompts and praise used by the teacher to help the children maintain orientation, continue walking, travel safely, and manipulate the devices were also recorded. Using an alternating treatments design, the experimenter observed the children as they walked on an experimental walkway with no device (Baseline 1), with both devices without training (Baseline 2), with both devices during training (Training), and with the better device after training (Precane Only and Maintenance). The children were asked to choose a favorite device near the end of training. Parent and teacher impressions of the devices, after viewing selected videotapes of the children traveling with and without the devices, were also assessed. Data showed that although learning occurred for both devices to varying degrees, all children used the precane device more competently and with slightly greater independence than the long cane by the end of training. Device use skills for both devices generalized to a nontraining setting. Precane skills were well maintained beyond the Training phase. The precane was found to be the more effective device overall in protecting the children from body contacts with travel obstacles, but no marked difference was evident in the children's travel speed with the two devices. Two of the three children who expressed a device preference favored the precane. Parents and teachers slightly preferred the appearance of the long cane, but judged the precane overall to be the more effective device for their children.

Simmons, Susan and Maida, Sharon O’ Mara. (1992). This booklet examines what Orientation and Mobility (O&M) is and how it can influence the independence of a child with visual impairment or blindness. The booklet is divided into four sections--

Reaching, Crawling, Walking, and Cane Use. In each section, terminology used by O&M specialists is explained, including "senses," "environment," "travel," and "space," and related to the child's developmental stage. The section on reaching notes the importance of stimulating the baby's interest in the toys and people in his or her environment. The section on crawling emphasizes the baby's use of all senses as he or she travels through the house exploring new environments and stresses the importance of encouraging the baby to do some things independently. The section on walking describes the developmental stages of the baby pulling himself up on furniture and cruising along walls and comments on the importance of arranging home furnishings for child safety. The section on cane use discusses pre-cane mobility devices such as push-toys and procedures for learning to use a white cane. Numerous black and white photographs illustrate the text.

LaGrow, Steven J. and others. (1997). This study is The Effect of Hand Position on Detection Distance for Object and Surface Preview When Using the Long Cane for Novisual Travel. This study evaluated effects of hand position when the long cane is used to assist travel for individuals with severe visual impairments. Subjects were 15 mobility instructors. The study found that the style with which one holds the cane when using the touch technique does affect detection distance for both surface and object preview.

Mcgregor, Robert Duncan. (1998). This study is Using Verbal and Physical Prompts to Teach The use of A long Cane to A Student Who is Visually Impaired And Has Additional Sere Disabilities. Orientation and mobility is the task of teaching persons with visual impairments to move independently, safely and purposefully through the environment. Traditional orientation and mobility techniques, and traditional methods of teaching those techniques, do not address the needs of those persons who have severe developmental disabilities, in addition to their visual impairments. A single subject, multiple treatment design was used to determine whether adolescents with severe visual impairments and severe developmental disabilities could be taught, by means of verbal and physical prompts, a modified cane technique that would allow them to travel independently in a familiar indoor

environment. The subjects were four female high school students, between the ages of 17 and 21, who were severely visually impaired and had severe developmental disabilities. Intervention occurred in a hallway in each subject's school. The subject had a functional purpose in traveling the route. Subjects were provided with canes of the appropriate length, with marshmallow tips. Interval recording was used to determine the percentage of time, during each session, that the subject was exhibiting the target behavior. In the baseline and first intervention phases, the target behavior consisted of holding onto the cane while walking the route. In subsequent phases, the target behavior was modified to include grasp and positional components. When the subject dropped her cane, held it with an inappropriate grasp, or moved it out of the prescribed position, a verbal or physical prompt was given. Generalization probes were taken over a different route, with a different intervenor. With each subject, the intervention resulted in an increase in the percentage of intervals in which the target behavior was exhibited. The study established that the verbal and physical prompts were effective in teaching four adolescents, with severe visual impairments and severe developmental disabilities, a modified diagonal cane technique that would be functional for them in traveling independently in a familiar indoor environment.

Wall, Robert Shawn. (1999). Study is A Biomechanical Analysis of Long Cane Technique use. This study examined the performance of the two-point touch long cane technique demonstrated by experienced long cane users (participants with visual impairments), instructors in long cane techniques (orientation and mobility instructors), and sighted participants naïve to long cane use. Participants' movements while wielding a long cane were recorded using a sophisticated motion analysis system. Participants were asked to use the long cane in four conditions: as they would normally, exhibiting perfect two-point touch technique, moving comfortably while maintaining adequate safety, and once again exhibiting perfect technique. The sighted participants also went through a series of training sessions and had their movement patterns recorded before and after each training session. Results indicated that experienced long cane users and instructors used the cane in similar ways. The sighted participants were equitable with the other two groups after a very short period of training. However, all groups diverged from perfect technique performance by moving

their hands to the right of midline and using cane tip arcs much larger than those prescribed by orientation and mobility texts. Analysis of biomechanical aspects of long cane technique performance indicate that the two main measures of performance (body coverage and step-to-cane rhythm) are not associated with each. Each of these two outcome measures appears to be linked with separate groups of biomechanical features. This indicates that there are at least two distinct processes involved in performance of the two-point touch technique. One implication of this finding is that the measure of body coverage is more appropriate for determining effectiveness of long cane use than step-to-cane rhythm.

R. Schellingerhout, R. M. Bongers, R. Van Grinsvent, A. W. Smitsman and G. P. Van Galen. (2001). Study Improving obstacle detection by redesign of walking canes for blind persons. This paper describes and experiment in which the performance of cane walkers with the traditional straight long cane and a redesigned cane, the curved cane, was compared. The curved cane has a curve where the tip touches the ground. Participants were 18 experienced cane walkers who were totally blind. The aspects of cane walking that were investigated included obstacle detection, drop-off (slope) detection and walking speed. The performance with both canes was investigated in two different ways: (1) by means of constructed courses in which objective measures of cane walking were derived; and (2) by means of more qualitative measures based on the participants' experiences with the curved cane during a 3-week try-out period. Results showed that obstacle-detection was significantly better with the curved cane, whereas drop-off detection and walking speed were comparable for the two canes. The participants' experiences mirrored these results.

Toshitka Tateishi (2002). Study E-cane with Situation presumption for the Blind. Blind people can not detect some obstacles with a cane that is the most successful and widely used travel aid. This paper describes E-cane designed for the Blind to support their traveling by detecting such obstacles.

Foregoing electric travel aid do not tell surroundings or obstacles, but just convert obtained data into certain signals such as vibration. E-cane presumes

surrounding from obtained data and notify interpretation. This Situation Presumption mechanism understands surroundings as combinations of walls and floors. This Wall-floor-strategy is designed for fast and robust processing.

Experiment results show that the proposal system can detect the obstacles, therefore the Blind can walk mare safety.

CHAPTER 3
METHORDOLOGY

The present study is a survey research design which aimed to investigate the knowledge and the attitude on using white cane of the visually impaired students in the secondary schools in Bangkok. The researcher uses questionnaire about using white cane in the students with visual impairment who are studying in secondary school in Bangkok.

Population

The population referred to the students with visual impairment who are studying in mainstreaming 7 regular schools in Bangkok. Academic year was 2003. There were 51 students as follow:

Table 1 Population

Schools	Students
Santiraj Wittayalai	17
Samsen Wittayalai	13
Sriayuthaya	8
Wat Makutkasat	7
Shinoros	3
Teplila	1
Saint Gabriel	2
Total	**51**

Sample group

This study is Knowledge and attitude on using white cane of the students with visual impairment in the secondary schools in Bangkok. The total number of population in the present study is 51. of 51 subjects, 45 are the study used available purposive sampling.

Instruments

In this study, the research instruments are to determine the level of knowledge on using white cane and the attitude toward it in students with visual impairment in Matayom 1 – 6 in Bangkok. The researcher modifies data collection to be appropriate with the purposive sampling by using those data and improving from literatures to determine instruments. The research instrument consists of 3 parts as followed:

Part 1: Demographic characteristics and general information

This part asks the general information of students with visual impairment who are studying with normal students in Matayom 1 – 6 in Bangkok, such as sex, education level, type of impairments and the main objective of O&M subject.

Part 2: About levels of knowledge on using the white cane.

There are 20 items in multiple choices

Part 3: About levels of attitude toward using the white cane.

There are 16 items of all by using Likert scale in 5 levels (Highly agree, agree, not sure, disagree, Highly disagree).

The steps for modifying the research instruments

The researcher modifies the research instruments by step as followed:

1. Studying researches and literatures about knowledge and attitude on using white cane of students with visual impairment.

2. Collecting the data from a part of studies to modify questionnaires in order to cover the objective of the research.

3. Having the adviser and the committee review checklist items to care behaviors and needs of the students with visual impairment.

4. Having the specialists review checklist items to care behaviors and needs of the students with visual impairment.

5. Presenting the information obtained from the specialists and the professionals to the adviser and the committee for approval.

6. Analyzing the questionnaire to find validity by Split half Method to find validity are the one time. After that, get outcome to divide into odd and even items. Then get analyzed by Rulon technique. (Poontrup Naknaka, 2001: 190)

Split half Method

$$r_{tt} = 1 - \frac{S^2_d}{S^2_t}$$

When r_{tt} = Validity coefficient

S^2_d = Standard deviation between first half score and after half score

S^2_t = Stand deviation almost score

The reliability value of the questionnaire was 0.80. Then experimenting with sample group in this research.

7. In part 2 of questionnaire, researcher used the general questionnaire about on using white cane. The researcher did not evaluate a difficult of questionnaire.

Data Collection

1. The presenting the permission letter from Ratchasuda College to sample schools, stating the objectives of this research, gathering the data during 1 December 2003 to 15 January 2004.

2. The researcher informed the sample group about the objectives of the study and asked for cooperation to answer the questionnaire.

3. The researcher made the questionnaire in braille for the sample group.

4. Collecting data, check the completion of the answers and analyzed statistic too.

Data Analysis

The data is analyzed and transferred by frequency percentage. The data is presented “descriptions and table”. In addition, the relation ship between the knowledge about using white cane and attitude toward it is calculated by Chi-square Method.

$$\chi^2 = \Sigma\Sigma \left(\frac{O_{ij} - E_{ij}}{Eij} \right)$$

After that, analyze χ^2 after get Chi – square score and compared in table from appendix .05 to find significant of statistic.

CHAPTER 4
RESULTS AND DISCUSSION

For a study of "Knowledge and attitude on using white cane of the visually impaired students in the secondary schools in Bangkok", the results of the research and the data analysis are divided into 4 parts as followed:

1. Personal Data of the Sample with Visual Impairment
2. Knowledge on using White Cane
3. Attitude towards White Cane
4. Relationship between the Knowledge on using White Cane and The Attitude towards it of students with Visual Impairment

1. Personal Data of the Sample with Visual Impairment

The personal information of the sample was classified by sex, education, type of visually impairment, and using of White Cane.

Table 2 Number and Percentage Distribution of the Samples with Visual Impairment by Sex

Gender	Number	Percentage
Male	20	44.4
Female	25	55.6
Total	**45**	**100.0**

Research results of personal data, which all are 45 samples who are the students with visual impairment show the population. Most of them were female (55.6 %) and male (44.4%). (Details as shown in Table 2)

Table 3 Number and Percentage Distribution of the Samples with Visual Impairment by the Level of Education

Matayom	Number	Percentage
1 – 3	28	66.2
4 – 6	17	37.8
Total	**45**	**100.0**

Most of the samples, 66.2 % were studying in Matayom 1 – 3 and 37.8 % of them were studying in Matayom 4 – 6 (Details as shown in Table 3)

Table 4 Number and Percentage Distribution of the Samples with Visual Impairment by the Type of Impairment

Types of Impairment	Number	Percentage
Blind	27	60.0
Low vision	18	40.0
Total	**45**	**100.0**

When classified by the type of visually impairment, 60.0 % of the samples were totally blind and 44.0 % of them were low vision (Details as shown in Table 4)

Table 5 Number and Percentage Distribution of the Samples with Visual Impairment by using White Cane

Using White Cane	Number	Percentage
Always	10	22.2
Sometimes	29	64.5
Not at all	6	13.3
Total	**45**	**100.0**

Most of the samples, 64.5 % sometimes use white cane, 22.2 % of samples always use it and 13.3 % of them do not use that at all. (Details as shown in Table 5)

Table 6 Number and Percentage Distribution of the Samples with Visual Impairment by Experiences of the White Cane Training

Experiences of the White Cane Training	Number	Percentage
Experienced	40	88.9
Inexperienced	5	11.1
Total	**45**	**100.0**

88.9 % of the samples have experienced to learn how to use the white cane that is Orientation and Mobility (O&M) training, and 11.1 % of them have inexperienced (Details as shown in Table 6)

Table 7 Number and Percentage Distribution of the Samples with Visual Impairment by the Types of White Cane Training

Types of White Cane Training	Number	Percentage
Part of the course offer at school	31	75.5
Long term training	4	10.0
Short term training	3	7.5
Parents/siblings	2	5.0
Total	**40**	**100.0**

75.5 % of the samples were used to learn how to use the white cane in the class, 10.0 % of them have learned that in the long term training, 7.5 % of them have learned in the short term training and 5.0 % of them have learned from their parents or siblings. (Details as shown in Table 7)

2. Knowledge on using White Cane

2.1 Level of knowledge on using White Cane

From the questionnaire to test the knowledge on using white cane, the researcher counts 1 point in a one correct answers and does not count incorrect answers. The score rage of knowledge level as followed;

High	12	point up
Moderate	9 – 11	point
Low	0 – 8	point

The researcher used the standard rule to divide, divided all item which are 20 item or 20 scores to 10 items or 10 score is standard score.

Table 8 Number and Percentage Level of knowledge on using White Cane

Level of score	Number	Percentage
High score level	10	22.2
Moderate	19	42.2
Low score level	16	35.6
Total	**45**	**100.0**

This research found that questionnaire testing knowledge of samples about white cane, 42.2 % of them got 9-11 points. 35.6% got more than 11 points and 22.2% got 0-8 points. (Details as shown in Table 8)

Among the 20 questions of the questionnaire, there were 2 students who got 14 right answers, which was the highest score. And there were 2 students who got 4 right answers, which was the lowest score. (Details as shown in Table 9)

2.2 Specific knowledge about White Cane

The questions that more than 50% of the samples got the right answers were as followed:

No. 1. What is the good length of white cane which is used for traveling?

No. 7. What is the correct way of using white cane indoor?

No. 8. What is the correct way of using white cane?

No. 9. When walking with white cane, how are the steps and white cane movement related?

No. 10. When you move the cane while walking, where should you place your hand?

No. 11. What should you do when you want to walk upstairs?

No. 14. Should people with low vision use white cane?

No. 16. Which statement is not true about the advantage of white cane?

No. 19. When getting on the bus, what should the blind do?

The questions that less than 50% of the samples got the right answers were as followed:

No. 2. How many types of white canes are there?

No. 3. What are parts of white cane?

No. 4. What are the advantages of the white cane?

No. 5. There are ……ways of using white cane.

No. 6. There are ……ways of holding white cane.

No. 12. When walking with the sighted guide, what is the correct way for the blind to do?

No. 13. When walking with the sighted guide, what should the blind person do with white cane?

No. 15. How can a blind person know that he already reaches the road to his house?

No. 17. When walking on footpath, on which side of the footpath should the blind walk?

No. 18. When taking a bus, what should the blind do?

No. 20. The disadvantage of white cane is that: the blind cannot trace something higher than their chest. What should they do to trace something that is higher than their chest?

Table 9 Number and Percentage Distribution of the sample with Visual Impairment by Knowledge on using White Cane

Item	correct Number	Percentage	Incorrect Number	Percentage
No. 1. What is the good length of white cane which is used for traveling?	30	66.7	15	37.7
No. 2. How many types of white canes are there?	10	22.2	35	77.8
No. 3. What are parts of white cane?	4	8.9	41	91.1
No. 4. What are the advantages of the white cane?	11	24.4	34	75.6
No. 5. There are ……ways of using white cane.	5	11.1	40	88.9
No. 6. There are ……ways of holding white cane.	5	11.1	40	88.9
No. 7. What is the correct way of using white cane indoor?	24	53.3	21	46.7
No. 8. What is the correct way of using white cane?	26	57.8	19	42.2
No. 9. When walking with white cane, how are the steps and white cane movement related?	30	66.7	15	33.3
No. 10. When you move the cane while walking, where should you place your hand?	24	53.3	21	46.7
No. 11. What should you do when you want to walk upstairs?	28	62.2	17	37.8
No. 12. When walking with the sighted guide, what is the correct way for the blind to do?	19	42.2	26	57.8

Table 9 (Cont.) Number and Percentage Distribution of the sample with Visual Impairment by Knowledge on using White Cane

Item	correct	Percentage	Incorrect	Percentage
	Number		Number	
No. 13. When walking with the sighted guide, what should the blind person do with white cane?	10	22.2	35	77.8
No. 14. Should people with low vision use white cane?	30	66.7	15	33.3
No. 15. How can a blind person know that he already reaches the road to his house?	21	46.7	24	53.3
No. 16. Which statement is not true about the advantage of white cane?	31	68.9	14	31.1
No. 17. When walking on footpath, on which side of the footpath should the blind walk?	12	26.7	33	73.3
No. 18. When taking a bus, what should the blind do?	14	31.1	31	68.9
No. 19. When getting on the bus, what should the blind do?	32	71.1	13	28.9
No. 20. The disadvantage of white cane is that: the blind cannot trace something higher than their chest. What should they do to trace something that is higher than their chest?	19	42.2	26	57.8

3. Attitude towards White Cane

The researcher used the standard rule to divide that testing score to range.

Positive Item

Highly agree	5
Agree	4
Not sure	3
Disagree	2
Highly disagree	1

Negatives Item

Highly agree	1
Agree	2
Not sure	3
Disagree	4
Highly disagree	5

The question about attitude toward 16 items, 8 positive items and 8 negative items

The researcher used the standard rule to divide that testing score to range.

Positive attitude towards	3.7 – 5	point
Neutral attitude towards	2.6 – 3.6	point
Negative attitude towards	1.0 – 2.5	point

Table 10 Attitude Score

Group of attitude towards	Range	Number	Percentage
Positive attitude towards	3.7 – 5	28	62.2
Neutral attitude towards	2.6 – 3.6	16	35.6
Negative attitude towards	1.0 – 2.5	1	2.2
Total		**45**	**100.0**

62.2 % of the samples score from 3.7 to 5. This group is categorized as those who have positive attitudes towards white cane. 35.6% of the samples score from 2.6 to 3.6. This group is categorized as those who have neutral attitudes towards white cane. And 2.2% of them score 1.00 to 2.5. This group is categorized as those who have negative attitudes towards white cane. (Details as shown in Table 10)

The samples with positive attitude might be because of their high knowledge about white cane and high frequencies of using white cane. For those who have neutral attitude, their knowledge about white cane might not be so high and were not confident about using it. The only one sample with negative attitude might have no knowledge at all.

4. Relationship between Knowledge and Attitude about White Cane

An analysis of cross break between three types of attitudes score and three levels of knowledge to identify the relationship between knowledge and attitude about white cane. (Details as shown in Table 11)

Table 11 Number Distribution of the Sample with Visually Impairment by Types of Attitudes and Level of Knowledge about White Cane

Attitude	level of knowledge			Total	χ^2	P value
	High	Moderate	Low			
Positive	7	13	8	28		
Neutral	3	6	7	16		
Negative	0	0	1	1		
Total	**10**	**19**	**16**	**46**	**1.207**	**0.577**

The analysis of relationship between knowledge and attitude of white cane categorized by type of attitude found negative attitude towards white cane to have a little knowledge. Among a total of 16 samples with neutral attitude, there are 3 samples who have high knowledge, 6 samples who have moderate, 7 samples who have low knowledge. Among total 28 samples with positive attitude, there are 7 samples who have high knowledge, 13 samples who have moderate knowledge, and 8 samples who have low knowledge.

The Chi-square analyzed show χ^2 = 1.207 which indicates no significant relationship at 0.05 level.

This means that there in no significant relationship between levels of knowledge and attitude in using white cane of the students with visually impairment in the study.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

The objectives of this study are:

1. To determine the level of knowledge on white cane using and the attitude towards it in students with visual impairment in Matayom 1 – 6.

2. To investigate the relationship between the knowledge on white cane using and the attitude towards it of the students with visual impairment in Matayom 1 – 6.

In this study, there was a survey about attitude of high school students with visual impairment. Samples were 45 students with visual impairment who studied at high school level in Bangkok. The survey was done during December 2003 to January 2004. The researcher used questionnaire as an instrument to collect the data. The questionnaire was in Braille so that the samples could answer by themselves. The data was analyzed, using statistical program. The relationship of factors was analyzed with Chi-Square.

5.1 Summary and Data Analysis

General Information:

The samples consist of 45 students with visual impairment. Among those 45 students, 66.2% of them were in junior high school. 60% were totally blind and 40% were low vision. 22.3% of them always use white cane. 88.9% have used to learn how to use white cane from the Orientation and Mobility (O&M) Training, and 75.5% of which have learned it in class.

5.2 Level of Knowledge about White Cane

From the questionnaire testing knowledge about white cane, 22.2% of samples got 0 – 8 points. 42.2% of them got 9 – 11 points and 35.6% got more than 11 points.

Among the 20 questions of the questionnaire, there were 2 students who got 14 right answers, which was the highest score. And there were 2 students who got 4 right answers, which was the lowest score.

The questions that more than 50% of the samples got the right answers were as followed:

No. 1. What is the good length of white cane which is used for traveling?

No. 7. What is the correct way of using white cane indoor?

No. 8. What is the correct way of using white cane?

No. 9. When walking with white cane, how are the steps and white cane movement related?

No. 10. When you move the cane while walking, where should you place your hand?

No. 11. What should you do when you want to walk upstairs?

No. 14. Should people with low vision use white cane?

No. 16. Which statement is not true about the advantage of white cane?

No. 19. When getting on the bus, what should the blind do?

The reasons why more than 50% of the samples could get the right answers can be:

1. These questions ask about the skills that they are familiar with. They may use these skills regularly. So they have good knowledge about it. This is congruent with the study of Aree Panmanee (1995: 90 – 95 cited in Kanjana Sengphol 1998: 20) which states that people tend to have long term memory of something that they frequently review and practice.

2. The samples may have been trained regularly about O&M skills.

3. The samples may have been using white canes since they were very young. So they are skillful and have good knowledge about white canes.

4. These questions are clear and not difficult to understand.

5. These questions do not contain technical terms and complicated language.

The questions that less than 50% of the samples got the right answers were as followed:

No. 2. How many types of white canes are there?

No. 3. What are parts of white cane?

No. 4. What are the advantages of the white cane?

No. 5. There are …….ways of using white cane.

No. 6. There are …….ways of holding white cane.

No. 12. When walking with the sighted guide, what is the correct way for the blind to do?

No. 13. When walking with the sighted guide, what should the blind person do with white cane?

No. 15. How can a blind person know that he already reaches the road to his house?

No. 17. When walking on footpath, on which side of the footpath should the blind walk?

No. 18. When taking a bus, what should the blind do?

No. 20. The disadvantage of white cane is that: the blind cannot trace something higher than their chest. What should they do to trace something that is higher than their chest?

The reasons why less than 50% of the samples could get the right answers can be:

1. The samples do use white cane in daily life. So they do not know much about it.

2. The samples did not get regular O&M Training. And some of them have never got trained.

3. Some questions have technical or academic terms.

4. The language used in some questions is too difficult.

5.3 Attitudes towards White Cane

62.2 % of the samples got score from 3.7 to 5. This group is categorized as those who have positive attitudes towards white cane. 35.6% of the samples got score from 2.6 to 3.6. This group is categorized as those who have neutral attitudes towards white cane. And 2.2% of them got score from 1.00 to 2.5. This group is categorized as those who have negative attitudes towards white cane.

For samples who have positive attitudes towards white cane, they may have been well educated about white cane and use it regularly. They, therefore, have positive attitudes towards white cane.

For those who have neutral attitudes towards white cane, they may not have much knowledge about white cane and do not have much confidence in using it. The researcher thinks the samples in this group should receive regular training so that they will have more chances to practice using white cane and feel more confident. Moreover, they should have more chances to meet with other people visual impairment so that they can exchange their experiences and techniques.

For one sample who has negative attitudes towards white cane, he/she should also receive more training so that he/she has more knowledge and more understanding about white cane. Hence, he/she will feel more confident in using white cane and have more positive attitudes towards it.

People with visual impairment should be well informed and well educated about white cane so that they can choose appropriate white canes for them. Nowadays, many people with visual impairment, especially children, are using inappropriate white canes. Some even do not know where to get white canes. The researcher thinks there should be Mobility and Orientation (O&M) Training in a wider group of visual impaired people.

5.4 Relationship between Knowledge and Attitudes of White Canes

Relationship between knowledge and attitude of white canes was statistically analyzed with Chi-Square. We found that the knowledge of samples about white canes is not related to their attitudes of white canes, with statistical significance of 0.05. This can be interpreted that the knowledge of samples about white canes is not related to their attitudes towards white canes. It can be explained by the following reasons:

1. The sample size is too small. Therefore, the data derived from this study may be not enough to be statistically analyzed.

2. The questionnaire may contain too many academically technical terms for the samples who are the students of the secondary school to answer.

5.5 Suggestions for Future Study

The suggestions for future study are:

1. When providing O&M training to the visual impaired, the instructor should include more specific topics such as types of white cane, and how to use white cane in different environments so that they can choose appropriate white canes for themselves and know how to use it. As a result, they can travel safely and independently, which is the main objective of O&M training.

2. The visually impaired should receive regular O&M training so that they can review and practice what they have learned. They can also improve their O&M skills and exchange their experiences with other trainees.

3. More research should be conducted with bigger sample size with more variety of education levels for more critical statistic values.

According to the researcher's opinion, the attitudes of people with visual impairment highly effect in their behavior in using white canes. Therefore, it is important that people with visual impairment have positive attitudes towards white canes. The following suggestions are made for encouraging people with visual impairments to have positive attitudes towards white canes:

1. To create positive attitudes towards white canes by educating people with visual impairments about the benefits of using white canes.

2. To let children with visual impairments know white cane since they are very young so that they feel familiar with white cane and can use it well when they grow up.

3. The need to use white can is another factor that affects attitudes of people with visual impairments toward white canes. Some people cannot afford to have sighted guide. So they have to travel by themselves. This group of people can use white canes better than those who have sighted guides.

4. Good strategy of O&M Training is also an important factor that affects attitudes of people with visual impairments towards white canes. If people with visual

impairments find the training interesting and fun to learn, they will be eager to learn and be more skillful. As a result, they will have positive attitudes towards white canes.

5. Variety of white canes: If there is a good variety of white canes, people with visual impairments can have more choices and can choose one that suits them most.

6. First impression about white canes: For people with visual impairments who got their first white canes which are appropriate for them, they will have positive attitudes towards white canes because of their positive first impression.

These suggestions are factors that O&M trainers should bear in mind when providing training for people with visually impairments so that they can live independently.

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APPENDIX A

Questionnaire (Thai Version)

ส่วนที่ 1 แบบสอบถามข้อมูลทั่วไป

จงเลือกตัวอักษรหน้าข้อความที่ตรงกับตัวนักเรียนมากที่สุด

1. เพศของท่านคือข้อใด
   ก. ชาย ข. หญิง
2. นักเรียนเรียนอยู่ในระดับใด
   ก. ชั้นมัธยมศึกษาตอนต้น ข. ชั้นมัธยมศึกษาตอนปลาย
3. ประเภทความบกพร่องทางการเห็นของนักเรียนคือข้อใด
   ก. ตาบอดสนิด ข. เห็นเลือนราง
4. ขณะนี้นักเรียนใช้ไม้เท้าขาวมากน้อยเพียงใด
   ก. ใช้ตลอดเวลา ข. ใช้เป็นบางครั้ง ค. ไม่ใช้เลย
5. นักเรียนเคยเรียนการใช้ไม้เท้าขาวหรือไม่
   ก. เคยเรียน ข. ไม่เคยเรียน
6. ถ้าเคยเรียน นักเรียนได้รับการเรียนในข้อใด
   ก. วิชาในชั่วโมงเรียน
   ข. อบรมระยะยาว
   ค. อบรมระยะสั้น
   ง. เรียนจากผู้ปกครอง / ญาติพี่น้อง
   จ. เรียนจากเพื่อนที่เป็นคนตาบอด
   ฉ. เรียนจากเพื่อนในชั้นเรียนในโรงเรียนเรียนร่วม

ส่วนที่ 2 แบบทดสอบความรู้เกี่ยวกับการใช้ไม้เท้าขาว

นักเรียนอ่านคำถามความรู้เกี่ยวกับการใช้ไม้เท้าขาวดังต่อไปแล้ว โปรดเลือกเฉพาะคำตอบที่ถูกเพียงข้อเดียว

1. ไม้เท้าขาวที่ใช้ในการเดินทางมีความยาวเท่าไหร่
   ก. ไม่ถึงกระดูกลิ้นปี่
   ข. อยู่ระหว่างกระดูกลิ้นปี่ถึงหัวไหล่
   ค. สูงกว่าหัวไหล่
   ง. ตามใจชอบ

2. ไม้เท้าขาวมีกี่ชนิด
   ก. 1 ชนิด คือ ไม้เท้าขาวชนิดท่อนเดียว
   ข. 2 ชนิด คือ ไม้เท้าขาวชนิดท่อนเดียวและชนิดพับเป็นท่อน
   ค. 3 ชนิด คือ ไม้เท้าขาวชนิดท่อนเดียว ชนิดพับเป็นท่อน และชนิดเสาอากาศ
   ง. 4 ชนิด คือ ไม้เท้าขาวชนิดท่อนเดียว ชนิดพับเป็นท่อน ชนิดเสาอากาศ และชนิดสำหรับคนสายตาเลือนราง
3. ส่วนประกอบของไม้เท้าขาวมีอะไรบ้าง
   ก. ตัวไม้เท้าอย่างเดียว
   ข. ตัวไม้เท้า, ที่จับ
   ค. ตัวไม้เท้า, ที่จับ, ปลายไม้เท้า
   ง. ตัวไม้เท้า, ที่จับ, ปลายไม้เท้า, เส้นยางยืด
4. คุณสมบัติของไม้เท้าขาวที่ดีคือข้อใด
   ก. ใช้ทนทาน, โครงสร้างแข็งแรง, และน้ำหนักมาก
   ข. ใช้ทนทาน, โครงสร้างแข็งแรง, และน้ำหนักเบา
   ค. ใช้ทนทาน, โครงสร้างยืดหยุ่น, และน้ำหนักมาก
   ง. ใช้ทนทาน, โครงสร้างยืดหยุ่น, และน้ำหนักเบา
5. การใช้ไม้เท้าขาวมีกี่วิธี
   ก. 1 วิธี คือ ใช้เหมือนกันทุกสถานที่
   ข. 2 วิธี คือ ใช้ในอาคารกับนอกอาคาร
   ค. 3 วิธี คือ ใช้ในอาคาร นอกอาคาร และใช้ขึ้นลงบันได
   ง. 4 วิธี คือ ใช้ในอาคาร นอกอาคาร ใช้ขึ้นลงบันได และใช้เมื่อมีผู้นำทาง
6. การจับไม้เท้าขาวมีกี่วิธี
   ก. 1 วิธี คือ จับแบบธรรมดาเพื่อสำรวจวิเคราะห์สภาพเส้นทาง
   ข. 2 วิธี คือ จับแบบธรรมดาเพื่อวิเคราะห์สำรวจ และจับแบบแกว่งสัมผัส
   ค. 3 วิธี คือ จับแบบธรรมดาเพื่อวิเคราะห์สำรวจ จับแบบแกว่งสัมผัส และจับแบบค้ำยัน
   ง. 4 วิธี คือ จับแบบธรรมดาเพื่อวิเคราะห์สำรวจ จับแบบแกว่งสัมผัส จับแบบค้ำยัน และจับแบบตะเกียบเพื่อสำรวจวิเคราะห์

7. การใช้ไม้เท้าขาวในร่มที่ถูกต้องคือข้อใด
   ก. เดินแกว่งไม้เท้าเข้าห้องเรียนและหาที่นั่งของตน
   ข. ยื่นไม้เท้าไว้ด้านหน้าและค่อย ๆ เดินเข้าห้องเรียนและหาที่นั่งของตน
   ค. เก็บไม้เท้าและก้าวยาว ๆ เข้าห้องเรียนและหาที่นั่งของตน
   ง. เก็บไม้เท้าและใช้เท้าของตนสำรวจทาง ค่อย ๆ เดินเข้าห้องเรียนและหาที่นั่งของตน
8. วิธีการใช้ไม้เท้าขาวที่ถูกต้องคือข้อใด
   ก. ถือไม้เท้าไว้ด้านหน้าและแกว่งไม้เท้าอย่างกว้าง ๆ เพื่อสำรวจพื้นที่ให้มากที่สุด
   ข. ถือไม้เท้าไว้ด้านหน้าและแกว่งไม้เท้าเล็กน้อย เพื่อสำรวจพื้นที่ทางเดินเฉพาะด้านหน้าที่จะเดิน
   ค. ถือไม้เท้าไว้ด้านหน้าและแกว่งไม้เท้ากว้างกว่าความกว้างของลำตัวตนเล็กน้อย เพื่อสำรวจพื้นที่ทางเดินด้านหน้าและบริเวณข้าง ๆ
   ง. ถือไม้เท้าไว้ด้านหน้าและไม่แกว่งไม้เท้า ลากไม้เท้าเดินไปเรื่อย ๆ
9. เมื่อแกว่งไม้เท้าขาวเวลาเดิน ปลายไม้เท้าสัมพันธ์กับการก้าวเท้าเดินอย่างไร
   ก. การก้าวเท้าเดินกับปลายไม้เท้าที่สัมผัสกับพื้นดินจะต้องสลับด้านกัน
   ข. การก้าวเท้าเดินกับปลายไม้เท้าที่สัมผัสกับพื้นดินจะต้องอยู่ทางเดียวกัน
   ค. การก้าวเท้าเดินกับปลายไม้เท้าที่สัมผัสกับพื้นดินจะสลับกันบ้างหรืออยู่ทางเดียวกันบ้างก็ได้
   ง. การก้าวเท้าเดินกับปลายไม้เท้าที่สัมผัสกับพื้นดินจะไม่สัมพันธ์กันเลย
10. เมื่อแกว่งไม้เท้าขาวเวลาเดิน ตำแหน่งของมือที่จะจับไม้เท้าขาวอยู่ที่ใด
   ก. ชิดขวาของด้านหน้าลำตัวและแกว่งไม้เท้าไปมาทั้งทางซ้ายและทางขวา
   ข. ตอนกลางบริเวณสะดือและแกว่งไม้เท้าไปมาทั้งทางซ้ายและทางขวา
   ค. ชิดซ้ายของด้านหน้าลำตัวและแกว่งไม้เท้าไปมาทั้งทางซ้ายและทางขวา
   ง. แบบไหนก็ได้ เมื่อแกว่งไม้เท้าไปมาทั้งทางซ้ายและทางขวา มือก็เคลื่อนตามด้วย
11. เมื่อเดินมาถึงบันไดจะทำอย่างไรกับไม้เท้าขาว
   ก. เก็บไม้เท้าแล้วเดินขึ้นเลยโดยไม่ได้จับราวบันได
   ข. เก็บไม้เท้าแล้วหาราวบันไดและจับราวบันไดเดินขึ้น
   ค. ถือไม้เท้าไว้ด้านหน้าและเดินขึ้นบันได โดยปลายไม้เท้าจะสัมผัสกับขั้นบันไดที่จะก้าวขึ้นต่อไป
   ง. ถือไม้เท้าไว้ด้านหน้าและจับราวบันไดเดินขึ้น โดยปลายไม้เท้าจะสัมผัสกับขั้นที่จะก้าวต่อไป

12. เมื่อเดินกับผู้นำทาง ผู้ใช้ไม้เท้าขาวจะปฏิบัติอย่างไรกับผู้นำทาง
    ก. จับไหล่ของผู้นำทางและยืนหลังของผู้นำทางแล้วเดินตามผู้นำทาง
    ข. จับไหล่ของผู้นำทางและยืนเยื้อนครึ่งก้าวของผู้นำทางแล้วเดินตามผู้นำทาง
    ค. จับข้อศอกของผู้นำทางและยืนหลังของผู้นำทางแล้วเดินตามผู้นำทาง
    ง. จับข้อศอกของผู้นำทางและยืนเยื้อนครึ่งก้าวของผู้นำทางแล้วเดินตามผู้นำทาง
13. เมื่อเดินกับผู้นำทาง จะทำอย่างไรกับไม้เท้าขาว
    ก. ไม่ต้องใช้ไม้เท้าเพราะอยู่กับผู้นำทาง
    ข. ใช้ไม้เท้าและแกว่งไม้เท้าเดินเพราะสำรวจพื้นผิวได้ดี
    ค. ใช้ไม้เท้าบางครั้งเพราะไม้เท้าช่วยทำให้รับรู้ก้าวต่อไปได้ดี
    ง. ไม่ใช้ไม้เท้าเพราะผู้นำทางจะเดินไม่สะดวก
14. ผู้มีสายตาเลือนรางควรใช้ไม้เท้าขาวอย่างไร
    ก. ไม่ต้องใช้ไม้เท้า จึงสะดุดอยู่เป็นประจำขณะกำลังเดินอยู่
    ข. ไม่ใช้ไม้เท้า จึงไม่กล้าเดินคนเดียวในที่มืด
    ค. ใช้ไม้เท้า จึงทำให้มีคนช่วยเหลือเป็นประจำ
    ง. ใช้ไม้เท้า จึงทำให้เดินได้อย่างมั่นใจในที่มืด
15. ข้อความต่อไปนี้ ข้อใดถูกต้องเกี่ยวกับการรับรู้คนตาบอดว่าตนได้มาถึงปากซอยเข้าบ้านแล้ว
    ก. ได้รับกลิ่นกาแฟจากร้านกาแฟที่อยู่ปากซอย
    ข. ได้ยินเสียงคนขายร้านกาแฟเรียก
    ค. ได้สัมผัสลมพัดจากด้านขวา
    ง. เจอตู้ไปรษณีย์ที่ตั้งอยู่ปากซอย
16. ข้อความต่อไปนี้ ข้อใดไม่ถูกต้องเกี่ยวกับการใช้ไม้เท้าขาวของคนตาบอด
    ก. จะรับรู้ลักษณะพื้นผิวถนนได้ว่าเป็นอย่างไรโดยใช้ปลายไม้เท้าขาวสัมผัส
    ข. จะรับรู้ลักษณะของหลุมที่อยู่ด้านหน้าได้ว่ามีขนาดใหญ่หรือขนาดเล็กและมีความลึกหรือมีความตื้นโดยปลายไม้เท้าขาวสัมผัส
    ค. จะรู้ว่าศีรษะของตนจะชนกับกิ่งไม้ที่ขวางอยู่กลางอากาศโดยใช้ไม้เท้าขาว
    ง. จะรู้ว่าบันไดที่จะขึ้นมีขั้นสูงหรือเตี้ยอย่างไรโดยใช้ไม้เท้าขาว

17. การเดินบนฟุตบาต คนตาบอดควรเดินอย่างไร
    ก. เดินตรงกลาง
    ข. เดินชิดด้านใดด้านหนึ่งไว้
    ค. เดินชิดขวา
    ง. เดินชิดซ้าย
18. การเดินไปหารถเมล์และหาทางขึ้น คนตาบอดควรทำอย่างไร
    ก. เดินมาถึงรถเมล์แล้วคอยให้มีคนพาขึ้นรถ
    ข. เดินมาถึงรถเมล์แล้วเดินเลาะด้วยมือที่ไม่ได้ถือไม้เท้า ไปทางข้างหน้าหรือทางข้างหลังทางใดทางหนึ่ง จนไปสุดแล้วจะย้อนกลับทางเดิม
    ค. เดินมาถึงรถเมล์แล้วเดินเลอะด้วยไม้เท้า ไปทางข้างหน้าหรือทางข้างหลังทางใดทางหนึ่งจนไปสุดแล้วย้อนกลับทางเดิม
    ง. เดินมาถึงรถเมล์แล้วเรียกคนให้พาไปขึ้นรถ
19. ขณะกำลังจะขึ้นรถเมล์ คนตาบอดควรจะทำอย่างไร
    ก. จับเสื้อของคนที่อยู่ข้างหน้าแล้วขึ้นตาม
    ข. จับปลายไม้เท้าด้านหนึ่งและให้คนที่อยู่ข้างหน้าจับปลายไม้เท้าอีกด้านหนึ่งแล้วขึ้นตาม
    ค. มือหนึ่งจับราวและอีกมือหนึ่งจับไม้เท้าถือไว้ด้านหน้าแล้วขึ้น
    ง. ไม่ถือไม้เท้าก้าวขึ้น
20. จุดบกพร่องของไม้เท้าขาวคือคนตาบอดไม่สามารถสำรวจสิ่งขีดขวางอยู่ที่สูงกว่าหน้าอก คนตาบอดจึงทำอย่างไรที่ป้องกันไม่ให้ชนกับสิ่งนั้น ๆ
    ก. ถือไม้เท้าขาวที่ยาวเท่าตน จับส่วนตอนกลางของไม้เท้าและถือแบบตั้ง ๆ และเดิน
    ข. ถือไม้เท้าขาวยกขึ้นระดับหน้าอกและเดิน
    ค. เอามือที่ไม่ได้ถือไม้เท้านั้นตั้งไว้บริเวณด้านหน้าศรีษะและเดิน
    ง. เอามือที่ไม่ได้ถือไม้เท้านั้นดังไว้บริเวณด้านหน้าหน้าอกและเดิน

ส่วนที่ 3 แบบวัดทัศนกติต่อกับการใช้ไม้เท้าขาว

โปรดเลือกค่าของคะแนนให้ตรงกับความคิดเห็นของนักเรียนดังนี้

5 = เห็นด้วยอย่างยิ่ง

4 = เห็นด้วย

3 = ไม่แน่ใจ

2 = ไม่เห็นด้วย

1 = ไม่เห็นด้วยอย่างยิ่ง

ข้อความ	ระดับความคิดเห็น				
	5	4	3	2	1
1. ไม้เท้าขาวเป็นอุปกรณ์ในการเดินทางที่น่าใช้					
2. การเดินทางโดยใช้ไม้เท้าขาวเป็นสิ่งสำคัญเพื่อดำรงชีวิตด้วยตัวเอง					
3. ไม้เท้าขาวเป็นสิ่งรุงรัง จึงไม่จำเป็นที่จะต้องใช้					
4. การถือไม้เท้าขาวทำให้เสียบุคลิคภาพ					
5. ไม้เท้าขาวช่วยคนตาบอดเดินทางได้อย่างอิสระมากขึ้น					
6. การใช้ไม้เท้าขาว ทำให้มีความมั่นใจในเวลาเดินทางด้วยตัวเองมากยิ่งขึ้น					
7. การใช้ไม้เท้าขาวเป็นสิ่งเกะกะ น่ารำคาญ แก่คนอื่น					
8. เมื่อเปลี่ยนสิ่งแวดล้อม การใช้ไม้เท้าขาวไม่สะดวก					

ข้อความ	ระดับความคิดเห็น				
	5	4	3	2	1
9. คนตาบอดควรใช้ไม้เท้าขาวเป็นประจำ					
10. การใช้ไม้เท้าขาวเป็นประจำเป็นที่รังเกียจของสังคม					
11. การใช้ไม้เท้าขาวทำให้เกิดความภูมิใจ					
12. การใช้ไม้เท้าขาวเรื่องสิ้นเปลือง					
13. การใช้ไม้เท้าขาวช่วยพัฒนาคุณภาพชีวิตให้ดียิ่งขึ้น					
14. การใช้ไม้เท้าขาวจะทำให้เข้ากลุ่มสังคมทั่วไปยากยิ่งขึ้น					
15. การเดินทางโดยใช้ไม้เท้าขาวทำให้สังคมมองว่าเป็นภาระ					
16. คนสายตาเลือนรางจะได้รับประโยชน์จากไม้เท้าขาว เช่นเดียวกับคนตาบอด					

APPENDIX B

Braille Questionnaire (Virtual Version)

Braille Questionnaire (Virtual Version)

Page 1

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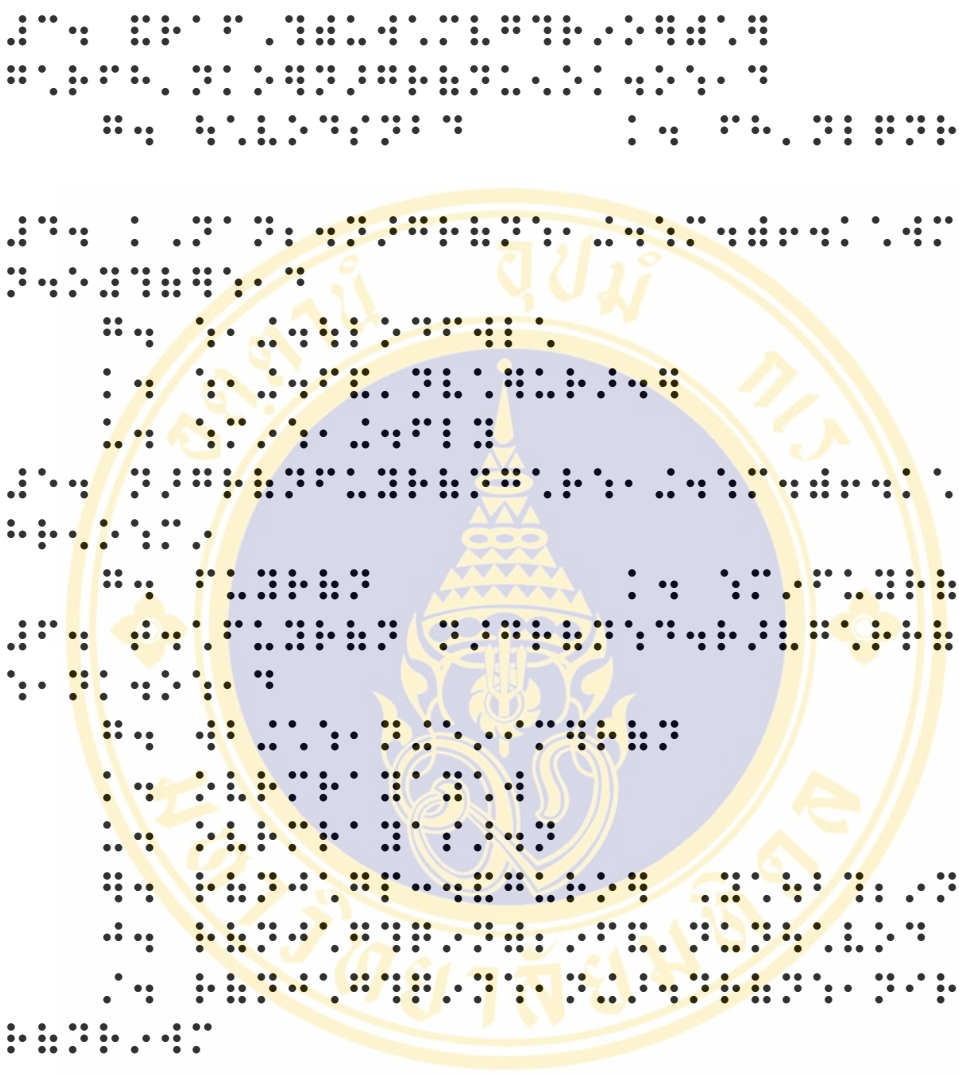

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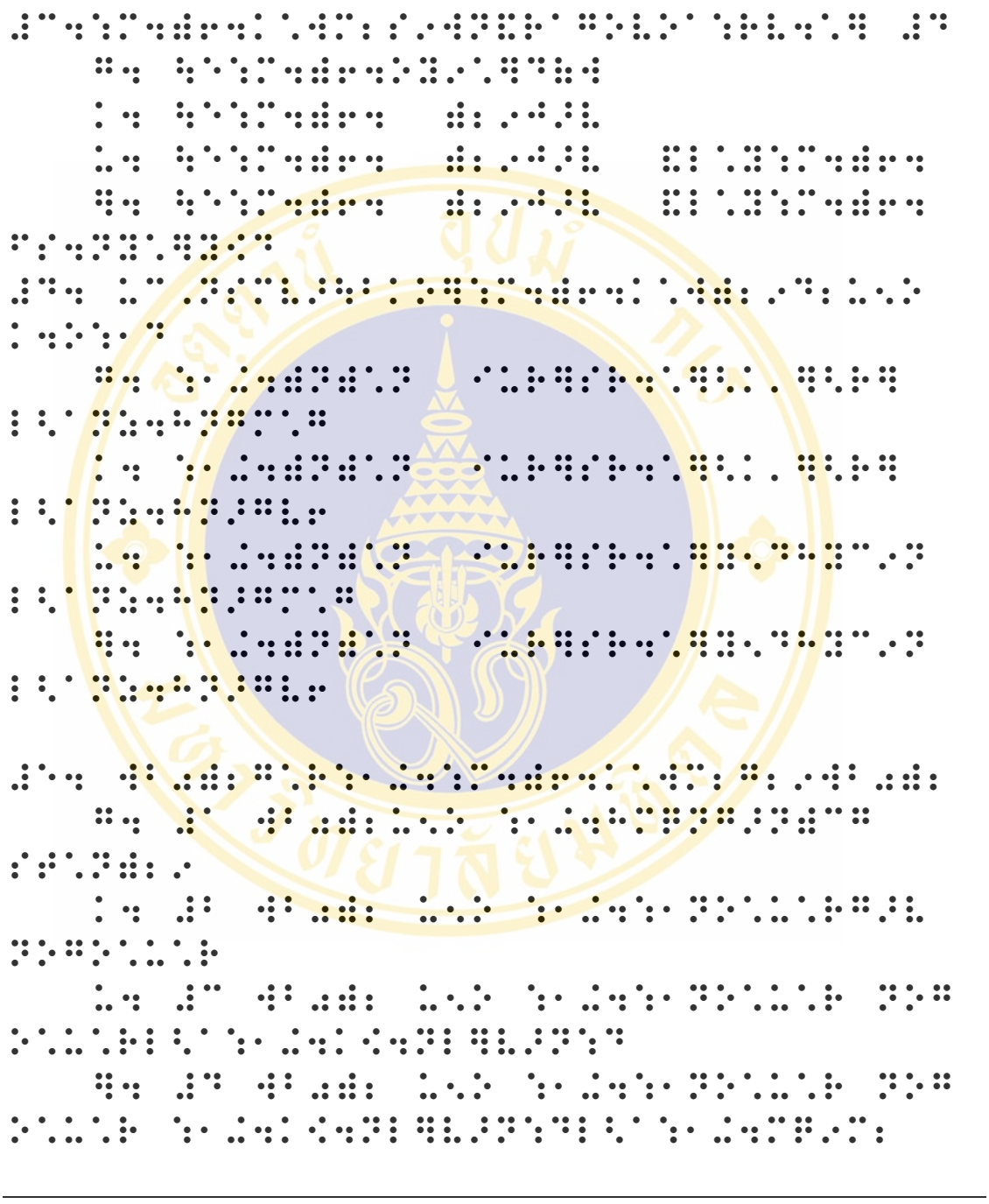
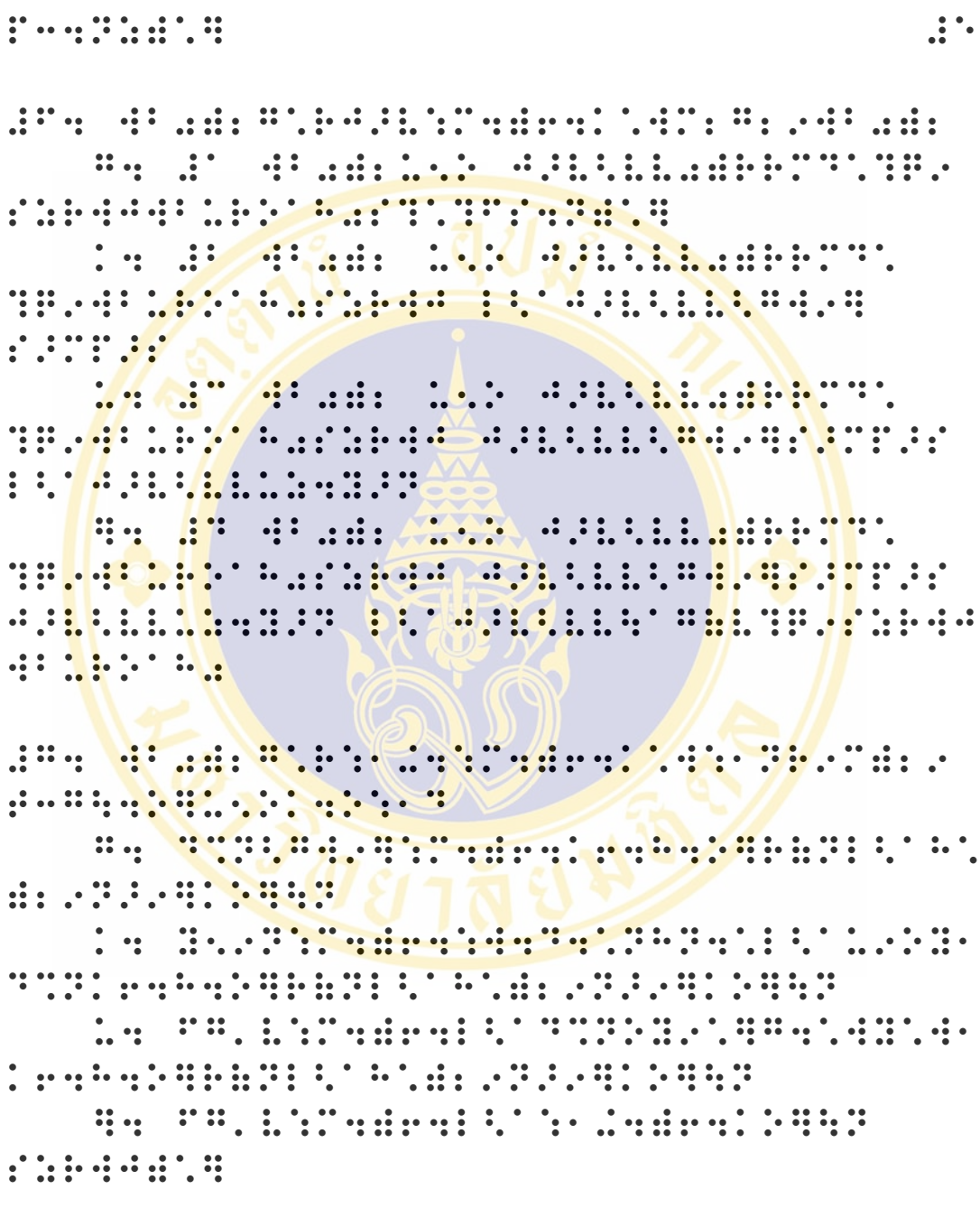


Page 5



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APPENDEX C

Information about mobility with using white cane

Kinds of white cane

Figure 3: Long Cane (Rigid Cane)

Figure 4: Folding Cane

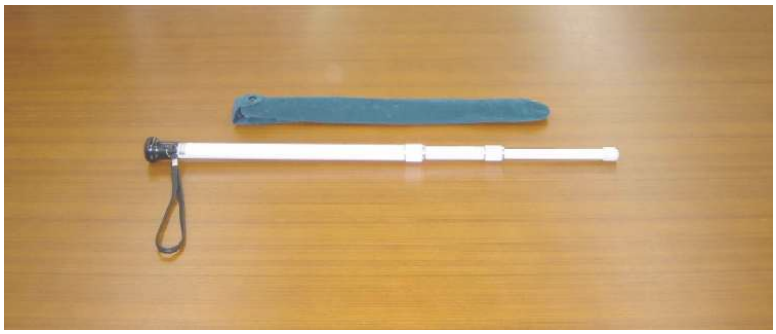
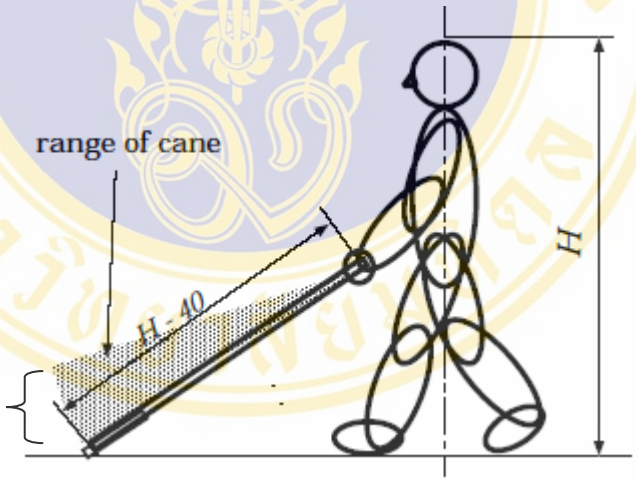


Figure 5: Telescopic Cane

The way of folding white cane

Figure 6: Touch technique (Toshitaka Tateishi, 2002: 6)



The range of lifting white cane in swinging

Figure 7: The posing of swinging white cane (Toshitaka Tateishi, 2002: 7)

APPENDIX D

The score table of the each sample in this research

Table 12: The personal score table of the each Samples in this research. (Knowledge and Attitudes)

No.	The score of knowledge	The level of knowledge	The average score of attitude	The level of attitude
1	9	2	4.13	3
2	9	2	3.88	3
3	6	1	3.44	2
4	9	2	2.88	2
5	6	1	3.69	2
6	12	3	4.50	3
7	8	1	4.50	3
8	4	1	3.06	2
9	4	1	2.44	1
10	10	2	4.63	3
11	5	1	2.88	2
12	13	3	4.00	3
13	12	3	3.81	3
14	11	2	4.38	3
15	8	1	4.00	3
16	12	3	3.88	3
17	9	2	3.63	2
18	9	2	4.38	3
19	11	2	4.06	3
20	7	1	4.31	3
21	11	2	3.44	2
22	14	3	3.19	2
23	13	3	3.31	2
24	9	2	4.63	3
25	9	2	3.06	2

Table 12: Continuous

No.	The score of knowledge	The level of knowledge	The average score of attitude	The level of attitude
26	4	1	3.00	2
27	4	1	3.00	2
28	5	1	4.19	3
29	5	1	4.38	3
30	14	3	3.94	3
31	13	3	3.75	3
32	14	3	4.38	3
33	9	2	3.25	2
34	8	1	4.94	3
35	11	2	4.50	3
36	8	1	4.75	3
37	10	2	4.38	3
38	9	2	4.94	3
39	9	2	4.69	3
40	12	3	3.13	2
41	8	1	3.06	2
42	7	1	4.00	3
43	11	2	3.81	3
44	10	2	3.50	2
45	10	2	4.31	3

Table 13: The personal score table for experimenting standard deviation with the each Samples in this research.

No	The score of even items	The score of odd items	The distinction of the score between even item and odd item	Total score even item and odd item
1	4	5	1	9
2	4	5	1	9
3	2	4	2	6
4	4	5	1	9
5	1	5	4	6
6	5	7	2	12
7	4	4	-	8
8	2	2	-	4
9	2	2	-	4
10	5	5	-	10
11	1	4	3	5
12	7	6	1	13
13	4	8	4	12
14	5	6	1	11
15	3	5	2	8
16	5	7	2	12
17	4	5	1	9
18	4	5	1	9
19	5	6	1	11
20	3	4	1	7
21	5	6	1	11
22	8	6	2	14
23	7	6	1	13
24	6	3	3	9
25	4	5	1	9

Table 13: Continuous

No.	The score of even items	The score of odd items	The distinction of the score between even item and odd item	Total score even item and odd item
26	2	2	-	4
27	2	2	-	4
28	1	4	3	5
29	1	4	3	5
30	8	6	2	14
31	8	5	3	13
32	7	7	-	14
33	6	3	3	9
34	4	4	-	8
35	6	5	1	11
36	4	4	-	8
37	3	7	4	10
38	2	7	5	9
39	4	5	1	9
40	6	6	-	12
41	3	5	2	8
42	4	3	1	7
43	6	5	1	11
44	5	5	-	10
45	4	6	2	10
Total	190	221	67	411
Total (χ^2)	964	1,179	173	4,115

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