The Blind and the Model of Architecture Touching[1]

Sanchai Santiwes[2]

Abstract

This academic article is a pilot study aimed to create architectural design knowledge management for the blind having them touch the paper models to see if and how they perceive the shape and plan. All of the volunteers, totally congenital blind, were asked to touch 3 paper models of the famous buildings representing each age like the Pyramid, Notre-Dame de Chartres and Guggenheim Museum for the ages of ancient, the middle and the modern respectively together with the processes of interview, observation, photography and note taking.

It was found that even though all the volunteers could not perceive and experience the architectural shape and form due to their totally congenital blindness, they could understand well when they were described and narrated along with the principle of Orientation and Mobility or "O&M" since they have been trained and learned about space and movement so that they could move safely in different environments. And to get them to understand more, the buildings' features and corridors were explained in 2D, floor by floor, from the bottom to the top, while they were learning and touching the paper models particularly prepared for them.

Keywords : Touch / Architectural Model / The Blind

Introduction

Since they lacked vision experience, the totally congenital blind could only use their sensation and perception including smelling, tasting, listening and the most important of all, touching by their hands and fingers, to perceive the shape and form of everything. However, something too much massive or large like the mountains, the rice fields and the buildings or the construction which are architectural related seemed impossible for them to touch or perceive.

[1] This article is a part of "Media Design for Art Education (Visual Arts) Learning Management for the Blind Upper-Secondary-School Students" (RDG5740011) supported by Thailand Research Fund (TRF) and National Research Council of Thailand (NRCT) in the budget of year 2014.

[2] Sanchai Santiwes, Ph.D., Lecturer at Faculty of Architecture in Khon Kaen University. E-mail: sanchai@kku.ac.th

According to the Eleventh National Economic and Social Development Plan (2012-2016), learning society, lifelong learning, learning opportunity and continuous and equal development for everybody including children and youth especially the disabled and the disadvantaged, as well as the first research strategy policy of the Eight National Research Policy and Strategy (2012-2016) : Northeast, National Research Council of Thailand which places an emphasis on the promotion of society potential development leading to opportunity and equality, education, morality and culture development mostly based on the disabled, in this study, the blind were regarded and chosen to participate to ensure that they learned in accordance with their capacity in the appropriate environment.

There are the objectives, such as studying the perception of forms and architectural planning by using touch the model, how making to be understanding about architecture forms and making the knowledge for architectural design for the blind.

Therefore, the opportunity of aesthetic architectural shape and form perception and comprehension given to the blind should be considered a great thing as it made them know, understand and appreciate the beauty of art like other sighted people. Although this study might be seen as just a little part, its result could be collected to set the appropriate rules, principles and theories of architectural design for the blind in the future.

Figure 1: Problem found during the study was that the volunteers could not perceive or understand the shapes of the building using the paper models but they still wanted to learn and practice.

Concept Review and Referred Theory

The person with impaired vision was divided into 2 groups; the totally blind and the one with just low vision and also divided into another groups; the congenital without the experience of seeing images, objects or environment and the adventitious with some experiences of seeing things before turning blind. (Lowenfeld, Berthold, 1981: 67, quote in Holbrook and Koenig, 2000: 58)

They were trained to learn about the principle of "Orientation and Mobility" (O&M) to gain the skill of being used to their necessary environment like inside or outside the house or the school through listening, smelling and touching so they could move safely to different places. At first they might be assisted or instructed by someone but were able to do it by themselves later.

"Being used to orientation is the ability to know exactly where one is while mobility is the ability to move from place to place." (Chalam Yam-iam, trans, 1988: 9)

"Thus, it can be summarized that the skill of being used to orientation and mobility is the skill the person with impaired-vision is able to use their senses left to understand and move freely, safely and purposefully within the environment around." (Suwimon Udompiriyasak, 2005: 2)

There are 3 important basic principles for the blind to understand and practice the skill of orientation and mobility, the first one is "Where I am?" the second "Where I am going?" and the last one is "How I am going there?". (Chalam Yam-iam, trans, 1988: 35) These principles may be relatively compared with the direction to help them understand more.

Perception is the process which one perceives message or external stimulus through one's senses relating to the affecting, the direction setting in the environment, the expectation, the organization of the environment relation using the process of interpreting, grouping and classifying in order to perceive better and respond purposefully and specifically.

As mentioned in the theory of vision perception (Vimolsiddhi Horayangkura, 1998: 49-62), the basic factor of vision environmental perception such as arranged composition in perception, depth, overlapping, lighting and shadow, motion, and perspective which consists of shape resizing, roughness, smoothness, brightness, position constancy, size, shape, lightness and color, and illusion effected by the environment, is the most important role causing environmental behavior. However, it depends on one's personal experience, practice and backgrounds what and how one responds or reacts when one perceives.

Architecture is the environment that communicates with signs, styles and symbols through character and composition, together with form, color, texture, lightness-darkness for anybody involved to communicate or share their ideas of aesthetics. (Chalerm Sujarit, 1981, quote in Vimolsiddhi Horayangkura, 1998: 10)

It is explained in the theory of Gestalt that the perception is the process happening after being stimulated and then interpreted using personal knowledge, experience and comprehension as it is said "Perception is Learned."

Therefore, without learning or experience, there will be only touching or being touched including Shape Perception composing of figure and ground, organization and pattern recognition, Motion Perception which is divided into 2 types (Rucharee Nopppaket, 1997: 157), physical movement and apparent movement, Distance Perception such as Relative Sign, Overlap Texture, Gradient, Linear Perspective, Atmospheric Perspective, and Constancy. (Matlin, 1995: 113-116, quote in Vimolsiddhi Horayangkura, 1998)

As above-mentioned, it was showed that the blind could define the direction and perception of the environment from constancy point of recognition. They used in navigation and mobility in the environment that are familiar. However, the blind could use their experiences to create a landmark and guess them as mind map. For example, a blind always walk in a school. It has entrance hall, toilet, administrative room, staff room and classroom. After that the blind walk in another school. He can predict the new environment by using the same experience. The environment of both may be similar or not. Therefore, the components of vision perception are important to be used to characterize and shape of the architecture to the blind understand by explanation with the O&M in the next.

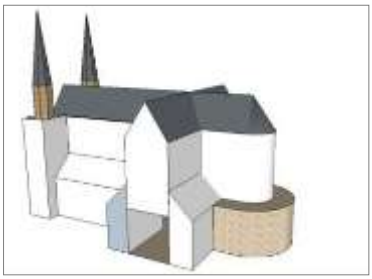
In the result of the research by John M. Kennedy "Drawing and The Blind" about the space perception of the blind, mostly based on the congenital ones , the explanation with drawing, direction, communication, scenery outline and the blind's analogy, using the technique of raised-line and imprints for their perception of lines and shapes and having them draw the lines of the objects and the environment on the flat plastic sheet with the stylus to create a raised-line image, it was found that most of them did it in 2D and even though some should be done in 3D. However, their images were quite like and similar to the work of the person with usual vision. (Kennedy, 1993: 5)

This study was analogous with the author's article saying that *"the totally congenital blind have concept about perception of space and surrounding as path and plan or map in 2-dimension. It is related to the principle of orientation and mobility (O&M), which is the moving skill to the target by themselves as correct and safety."* (Sanchai Santiwes, 2014: 53-54)

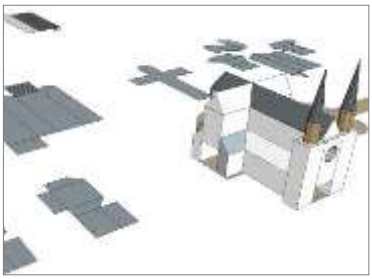
Experiments and Materials

It was found in the author's study that the blind's skill of "O&M" was the main factor enabling them to understand the context of space so they could move safely to the right directions and positions in the buildings or architecture through their 2D plan perception and comprehension. And when they moved to the different floors, lower or upper, they still used that 2D comprehension although they perceived and knew that there was a vertical direction movement or 3D. It's obvious that the Z axis or vertical direction, for them, was perceived as a path or way leading them to the exact point.

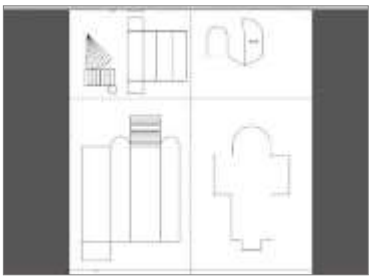
During the field of pilot study, 3 paper models of architectural work including the Pyramid, Notre-Dame de Chartres and Guggenheim Museum which was designed by Frank Lloyd Wright, representative for each age, the ancient, the middle and the modern one respectively, were touched by the volunteers who were students from Khon Kaen School for the Blind. Some of the volunteers were totally blind while some were only poor-sighted. All the paper models were made by the computer program for the architectural design, SketchUp, with some details reduced and only main and significant ones remained, together with SketchUp plugins called "Unfold tool" to unfold the 3D shape of the models into the flat surface, printed out, cut into pieces, then folded and remade using some tools like scissors and clear adhesive tape. These models could be used as a temporary learning media and the technique could be disseminated to any schools as it was repeatable.



(1) The shape of the building after some details being reduced.



(2) To assembly the model using Unfold tool.



(3) To paste on the A4 sized paper.

(4) To print out on the A4 sized paper (180 grams).

(5) Cut into pieces using the scissors.

(6) Fold to look like the original one using clear adhesive tape.

Figure 2: The steps of making paper models.

Figure 3: The models of 3 ages of architecture made with paper folding technique.

Results

Of all volunteers in the study, it was found that the ones who are totally congenital blind could not understand the shape of the architectural paper model they were touching as they have not experienced or seen it before. Moreover, the real building, unlike the small object such as a tree and its leaf, a chair, a person or an animal which they could understand and draw, was too much big for them to touch in order to create the concept of it.

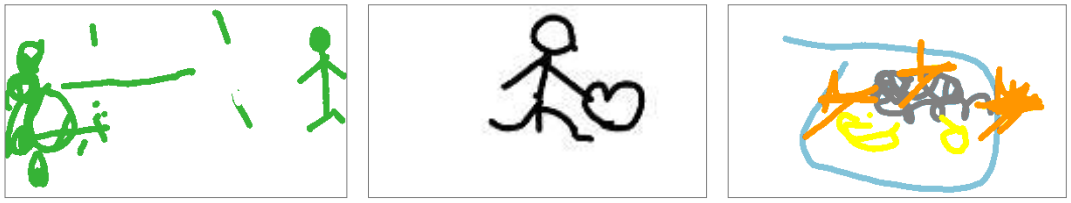


Figure 4: The drawings by the totally congenital blind.

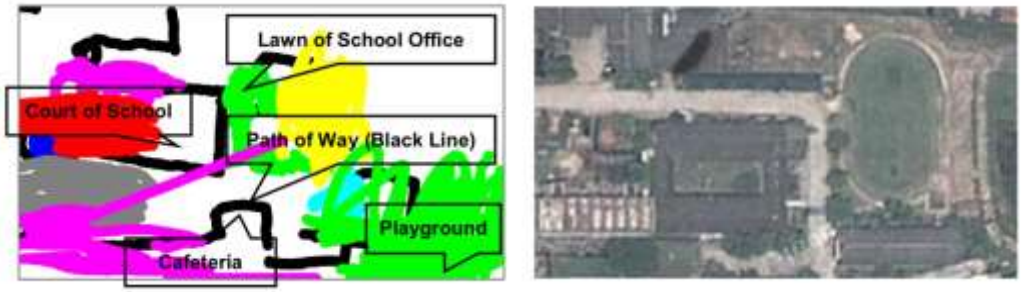


Figure 5: The drawing of "My School Map" by the totally congenital blind (left) comparing to aerial photograph (right) of Khon Kaen School for the Blind from Google Map. (Sanchai Santiwes, 2014: 51)

When being interviewed by the author, they suggested that they were able to understand about dimension and space despite their totally congenital blindness. They could move to the right places in different circumstances safely using their left senses such as listening, smelling and touching to perceive the distance of a big object in front of them or how narrow or wide the room was, listening to the echo. Besides, they could remember some

important points like a pole, ladder and a handrail or could recognize the position from the inertia while they were travelling by bus including going straight, stopping, turning and crossing the bridge.

To enable them to understand about the architectural shape, the principle of O&M and being explained about the building features, from the entrance to the rooms, in 2D-level alongside the layer level like the doors, the windows, other decorations and the roofs, while they were touching the models, could not be overlooked, so they could know exactly "Where I am?", "Where I am going to?" and "How I am going there?" as they basically understand about object size comparing. However, it had to be done gradually.

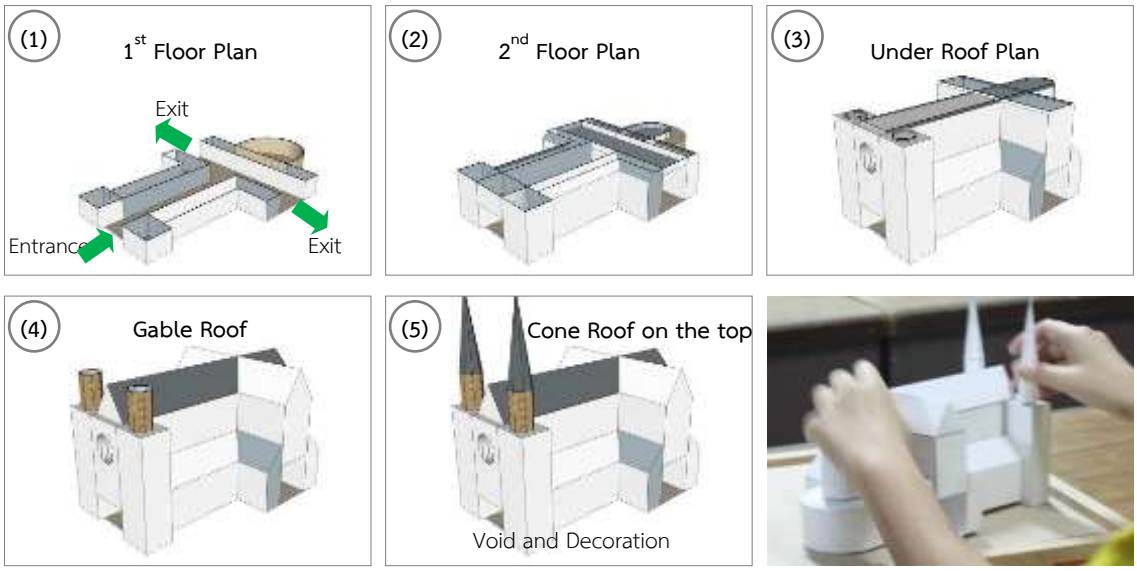


Figure 6: The examples of the steps of architectural shape paper models being described to the blind (3D Model Source: https://3dwarehouse.sketchup.com/model.html?id=290b5b46633c5fb38fb37abf337da9ec)

Table 1: The volunteers criticizing while touching architectural paper model.

Experimental Models.	Opinion and Criticism by Volunteers.
	"Pyramid" could be easily perceived due to its reputation and geometric shape and form. All of the volunteers have heard of it.
	"Notre-Dame de Chartres" seemed so difficult for the totally blind to perceive or understand as they have not heard or experienced it before, nevertheless, they paid their attention and enjoyed learning.
	"Guggenheim Museum", with its unfamiliar and strange shape and form, might be quite hard for most of them who were used to the usual and common building with the gable or projecting roof to understand. However, they were able to perceive eventually.

Conclusion

The study result provided the ideas for design guideline of building planning and space for the blind in the future since it could be used as design criterions for their perception and safety. The study has given them a chance to know, understand and appreciate the architecture, one of valuable branches of art, which the blind can perceive by mapping and 2D space to be compose with the O&M that it is basis. This study could be making the knowledge and criterions of architectural design for the blind. Not only it makes the Braille-block to navigate for the blind but also brought about to design of safety for the blind as universal design. For example, making the navigation map for circulation in building by using bas-relief figure, making the maps relief for the fire escape, defining the criterions of architectural design for safety and comfortable to the blind, and including learning management of visual arts and architectural history for the blind. So it should be regarded as a great thing leading to society and human equality and fairness even though somebody might think it was just a little issue or component.

Figure 7: The Delightful Atmosphere after Finishing Activities

Acknowledgement

I gratefully acknowledge the support and generosity of Miss Canetr Phandej and the volunteers, who are the students at Khon Kaen School for The Blind in The Christian Foundation for The Blind in Thailand under The Royal Patronage of H.M. the King.

Bibliography

[English references]

Holbrook, M. Cay, and Alan J. Koenig. (2000). **Foundations of education: history and theory of teaching children and youths with visual impairments.**, pp. 55-63. 2nd ed. New York: AFB Press.

Kennedy, John M. (1993). **Drawing and the blind: picture to touch** [electronic version]. London: Yale University Press.

Lowenfeld, Berthold. (1981). "Effects of blindness on the cognitive functioning of children." **In Berthold Lowenfeld on blindness and blind people: Selected papers.** New York: American Federation for the Blind.

Trimble. (2013). **SketchUp Educational Use** [computer program]. California: Trimble Navigation Limited. Accessed February 14, 2015. Available From http://www.sketchup.com

[Thai References]

Arwut Ankawut. (2002). **Buddhist temple for visually impairment.** asa Journal, Vol.4-5, 2545, 70-73. [อาวุธ อังคาวุธ. (2545). วัดสำหรับผู้พิการทางสายตา. บทความพิเศษ วารสารอาษา ฉบับที่ 4-5, ปี 2545, หน้า 70-73.]

Chalam Yam-iam, trans. (1988). **Community-Based rehabilitation of the rural blind - A training guide for field workers.** Bangkok: Donbosgo Press. [แฉล้ม แย้มเอี่ยม, ผู้แปล. (2531). การฟื้นฟูสมรรถภาพของคนตาบอดในชนบทและการฝึกผู้สอนคนตาบอดในท้องถิ่น. กรุงเทพฯ: โรงพิมพ์ ดอนบอสโกการพิมพ์.]

Chalermpol Sombuttiyanichit. (2011). **Architecture therapy "Case study for the blind".** Thesis in Master of Architecture, Silpakorn University. [เฉลิมพล สมบัติยานุชิต. (2554). สถาปัตยกรรมบำบัด "กรณีศึกษาสำหรับคนตาบอด". วิทยานิพนธ์หลักสูตรปริญญาสถาปัตยกรรมศาสตรมหาบัณฑิต สาขาวิชาสถาปัตยกรรม มหาวิทยาลัยศิลปากร.]

Chaowat Kittitornkul. (2006). **Library for the blind.** Thesis in Master of Architecture, Silpakorn University. [เชาว์วัฒน์ กิตติธรกุล. (2549). ห้องสมุดสำหรับคนตาบอด. วิทยานิพนธ์หลักสูตร ปริญญาสถาปัตยกรรมศาสตรมหาบัณฑิต สาขาวิชาสถาปัตยกรรม มหาวิทยาลัยศิลปากร.]

Rucharee Nopppaket. (1997). **Psychology of perception**. Bangkok: Prakayprueg. [รัจรี นพเกตุ. (2540). จิตวิทยาการรับรู้. กรุงเทพฯ: ประกายพรึก.]

Sanchai Santiwes. (2012). **The Art of Drawing and Painting with the Original Through Touch-Screen Monitor by The Congenital Totally Blind.** Veridian E-Journal, Vol.5, No. 3 (September - December 2012): 1-18. [สัญชัย สันติเวส. (2555). "การวาด ภาพระบายสีตามภาพศิลปะต้นแบบผ่านจอภาพแบบสัมผัสโดยคนตาบอดสนิทตั้งแต่กำเนิด." วารสารวิชาการ Veridian E-Journal, ปีที่ 5, ฉบับที่ 3 (เดือนกันยายน-ธันวาคม 2555): 1-18.]

_____. (2014). **Perception of Space and Surrounding by Expression of Painting in Colors of the Blind.** Journal of AR KKU (Faculty of Architecture, Khon Kaen University), Vol.13, 2014, 41-54. [สัญชัย สันติเวส. (2557). การรับรู้ที่ว่างและสภาพแวดล้อมโดยการแสดงออกผ่านทางการวาดภาพระบายสีของคนตาบอด. วารสารวิชาการปีที่ 13 ปี 2557 คณะสถาปัตยกรรมศาสตร์ มหาวิทยาลัยขอนแก่น: 41-54.]

Supang Chantavanich. (2011). **Data analysis of the qualitative research**. 10th ed. Bangkok: Chulalongkorn University Press. [สุภางค์ จันทวานิช. (2554). การวิเคราะห์ข้อมูลในการวิจัยเชิงคุณภาพ. พิมพ์ครั้งที่ 10. กรุงเทพฯ: โรงพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย.]

Suwimon Udompiriyasak. (2005). **Orientation and mobility for the pre-school visually impaired children**. Bangkok: Suan Dusit Rajabhat University. [สุวิมล อุดมพิริยะศักย์. (2548). ทักษะความคุ้นเคยกับสภาพแวดล้อมและการเคลื่อนไหวสำหรับเด็กที่มีความบกพร่องทางการเห็นวัยก่อนเข้าเรียน. กรุงเทพฯ: มหาวิทยาลัยราชภัฏสวนดุสิต.]

Thanit Pianmaniwong and Wisut Phongern. (2014). **The development of skill practices in visual art elements and compositions for secondary school students in Saint Gabriel's School, Bangkok.** Veridian E-Journal, Vol.7, No. 2 (May - October 2014): 1497-1508. [ธนิตย์ เพียรมณีวงศ์ และวิสูตร โพธิ์เงิน. (2557). "การพัฒนาแบบฝึกทักษะด้วยตนเองทางทัศนธาตุและองค์ประกอบศิลป์สู่การสร้างงานทัศนศิลป์สำหรับนักเรียนระดับชั้นมัธยมศึกษาตอนปลาย โรงเรียนเซนต์คาเบรียล กรุงเทพฯ." วารสารวิชาการ Veridian E-Journal, ปีที่ 7, ฉบับที่ 2 (เดือนพฤษภาคม-สิงหาคม 2557): 1497-1508.]

Vimolsiddhi Horayangkura. (1998). **Human behavior and the environment: behavior basis for design and planning.** 5th ed. Bangkok: Chulalongkorn University Press.
[วิมลสิทธิ์ หรยางกูร. (2541). พฤติกรรมมนุษย์กับสิ่งแวดล้อม มูลฐานทางพฤติกรรมเพื่อการออกแบบและวางผัง. พิมพ์ครั้งที่ 5. กรุงเทพฯ: โรงพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย.