Research in Arts Education（2011），22，37-39。

A Case Study on Teaching a Congenitally Totally Blind Adult to Represent a Solid Cube on a Two-Dimensional Surface

Bin I [1]

Wan-Chi Chang [2]

Summary

This research is a case study aiming to teach a congenitally blind adult to learn sighted people's strategies of drawing a cube, mainly oblique projection, in order to understand whether the sighted people's principles of pictorial spatial representation could be understood by blind people through suitable teaching and learning.

The participant, a 25-year-old congenital blind adult with a bachelor degree, had light perception before, but without any drawing experience, learned the principles of oblique projection and pictorial depth through the following practices: (1) tactile picture identification; (2) tactile picture classification; (3) 3-D model and tactile picture matching; (4) drawing a cube with different facets; (5) drawing a press-able skeleton cube; (6) drawing a foldout-able cardboard cube; (7) identifying pictures drawn on plastic slabs. Each of them was conducted with explanations and might be combined depends on occasions.

In the pretest, the participant drew the cube in orthographic projection, i.e. as a square, which is common for the totally blind adolescents or even adults, but mostly for the young sighted children. He selected a square in the judgment task, too. The same strategy was used in drawing other geometric models. To represent organic models, many assembled dots and lines were presented as textural details without a close line as contour to separate the object and the background. Such presentation was more primitive than the

[1] Professor / Graduate Institute of Design, National Taiwan Normal University

[2] Doctor Candidate / Graduate School of Design, National Taiwan University of Science and Technology

Paper accepted April 22, 2011

orthographic projection stage.

After ten one-on-one lessons, the participant could select the oblique-objected pictures from many alternatives and draw the cube with three facets although still could not realize the connected top and side facets. The participant could draw a table with a rectangle to represent the top and three vertical legs. The results suggest that the congenitally totally blind people could possibly draw oblique projection through proper learning and frequent practice; it is not easy for blind people, though. The learning effect was also found in drawing organic models. The participant learned to use close line to separate the model from the background, which suggests that after teaching, the participant began to adopt visual integral thinking instead of the usual blinds' tactile linear thinking.

The results indicate that the physical and mental state of the participant, tactile measuring technology, the learning outcomes of different types of models, subtle model difference, and convenient materials might affect the blind people's learning efficiency of spatial representation. In addition, long-term stable and frequent practice might also be a necessary condition.

Given the observations of this study, the suggested teaching processes are as following: (1) Pretest (including basic tactile ability of images, picture selection, and the pretests of the target, similar target, and non-target). (2) Teaching and drawing exercises, such as concept guidance, practical teaching (including picture selection, instruction with real teaching materials, picture demonstration, and live demonstrations), and drawing exercises. (3) Posttest (including picture selection, and the posttests of the target, similar target, and non-target).

Spatial representation is the concept and the technique of transforming solid objects into plane paper. It is the key point of drawing. Only one participant who were taught the strategies of oblique projection of sighted people in this study cannot answer all of the questions about teaching the blind people monocular depth cues, but this individual's improvement in drawing is not meaningless. Although after ten lessons the participant can not fully achieve the objective of "using oblique projection to represent a cube", but he did make progress of conceptual and practical drawing strategy, showing that to teach blind people the spatial representation is not impossible.

Whether it is possible for the blind to grasp the principle of linear perspective, such as

foreshortening and the convergence of parallel lines to a common vanishing point, through tactile learning is still theoretically controversial. There was no similar case reported in Taiwan. The possible reason could be the blind people in Taiwan grew up in an environment where the opportunity of drawing was not even given. Nevertheless, from the viewpoint of education, the importance of perceiving images for the blind is as much as that for the sighted people.

On the application of the research, it is suggested that teachers can take the present Rubrics as assessment reference in the Performing Art or Drama class; however, it is expected that teachers should use it flexibly and wisely. They can choose two or three items on the scale to fulfill their teaching objective in each class. Moreover, it is also expected that teachers can use the developing process in this research as a model to build their own Rubrics on any teaching content for themselves. In this way, teachers can really make the full use of the developed Rubrics and make the students' assessments more objective and rigorous.

Keywords: spatial representation, congenitally blind, tactile drawings, picture identifying