The role of education in design; comparing trained and nontrained students

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Abstract: This paper is part of an analytical research project focused on the role of education in students which have been trained in design with those who have no and explores the question- How will the training effect the design view of a young student ?. An approach combining cross sectional and empirical study was done as a case study on student's concepts. In this quantitative research, 40 volunteers in grade two and three at secondary school were examined. The results revealed the detailed approaches about the design process within two groups and formulized a set of hypotheses about the special design perception in trained students.

Key words: design education, comparative study, trained and non-trained designers.

1. Introduction

Future generations will be called to solve some of the most challenging problems ever created and faced by man. Our children must master systems-thinking to envision multiple methods for addressing complex challenges like renewable energy, world hunger, climate change, and ultimately, the design of a better world. They must also possess the compassion to recognize the rising human population and create a world that is inclusive, rather than exclusive. Design as a knowledge conceptualizes a process of open-ended inquiry aimed to create innovative systems and products to solve the problems. The process of design and development starts with the generation of ideas, which are traditionally represented as handmade sketches. As the concept gradually evolves, the designer has the possibility of applying tools such as digital 3D modeling, physical models and rapid prototyping. The purpose of these models is to adjust and improve the design ideas in functional, ergonomic or aesthetic features. As it was mentioned like all other knowledge, design has its own phases and like all other knowledge needs to be taught as we explore this in this article. Education gives us knowledge of the world around us. It develops in us a perspective of looking at life. It helps us build opinions and have points of view on things in life. People debate over the subject of whether education is the only thing that gives knowledge. Some say, education is the process of gaining information about the surrounding world while knowledge is something very different. They are right. But then, information cannot be converted into knowledge without the catalyst called education. Education makes us capable of interpreting things rightly. It is not just about lessons in textbooks. It is about the lessons of life. Design education is a fundamental part of the educational spectrum. There is a need for design to be treated as a subject in which everyone is involved at school. This is an investigation about students in secondary school who have had not education in design neither at school nor out of it. These students are named N-students in the following paper and the other group is shortly called T-students. The Weighted Objectives Method is an evaluation method for comparing design concepts based on an overall value per design concept. The biggest disadvantage of using the Datum method or the Harris profile is that the scores per criterion cannot be aggregated into an overall score of the design alternative. This makes a direct comparison of the design alternatives difficult.

2. Methodology

The experiment was done from 19 October 2011 to 27 May 2012 with 40 girl students at the age of 13 and 14 who were volunteers among 380 students. They were assigned into 2 groups with 20 students in each. One group has spent 7 months of design courses and the other one was completely non-trained in the field of design. They were examined with a simple design project.

All students' jobs were recorded, as some of them are attached to the article, lasting for 90 minutes duration. Some students design process yielded more, the usual detailed analysis of every clause was obviously impracticable. As weighted objective method was developed to provide which the concepts could be analyzed in terms of the research and it was done by two design teachers separately. The average score defined the results. Data were entered in Excel and then scoring and weighting of each factor showed the final result. The Weighted Objectives Method was used because it is best used when a decision has to be made between a select number of design alternatives, design concepts or principal solutions. Usually, the Weighted Objectives Method is used when evaluating design concepts, and to make a decision as to which design concept should be developed into a detailed design. The Weighted Objective Method assigns scores to the degree to which a design alternative satisfies a criterion. However, the criteria that are used to evaluate the design alternatives might differ in their importance. For example, the cost price can be of less importance than appealing aesthetics. The Weighted Objectives Method involves assigning weights to the different criteria. This allows the decision-maker to take into account the difference in importance between criteria. Cross-sectional research is a research method often used in developmental psychology, but also utilized in many other areas including social science and education. This type of study utilizes different groups of people who differ in the variable of interest, but share other characteristics such as socioeconomic status, educational background, and ethnicity. The other method used to explore was Case study research. This method explores through reports of past studies, allows the exploration and understanding of complex issues. It can be considered a robust research method particularly when a holistic, in-depth investigation is required. Recognized as a tool in many social science studies, the role of case study method in research becomes more prominent when issues with regard to education (Gulsecen & Kubat, 2006), sociology (Grassel & Schirmer, 2006) and community based problems (Johnson, 2006), such as poverty, unemployment, drug addiction, illiteracy, etc. were raised. One of the reasons for the recognition of case study as a research method is that researchers were becoming more concerned about the limitations of quantitative methods in providing holistic and in-depth explanations of the social and behavioral problems in question. Through case study methods, a researcher is able to go beyond the quantitative statistical results and understand the behavioral conditions through the actor's perspective. By including both quantitative and qualitative data, case study helps explain both the process and outcome of a phenomenon through complete observation, reconstruction and analysis of the cases under investigation (Tellis, 1997). The Weighted Objectives Method does exactly this: it allows the scores of all criteria to be summed up into an overall value per design alternative.

3. Results

Reviewing students sketches, the data presented to the following classification was obtained. Figure 1 shows the result difference between 2 groups of students for factor 1 which is creativity. Average high 9.5 and average low 3.5 in trained students was higher than non trained students. Average high for none trained students was 6.5 and average low was 1.

trained	creativity	producible	environmental friendly	detail	plurality of concepts	non trained	creativity	producible	environmental friendly	detail	plurality of concepts
1	5	9	5	4	4	1	2	5	3	2	1
2	6	6	4	7	5	2	1	2	1	1	1
3	9	7	8	7	5	3	8	5	7	5	5
4	9	6	5	6	1	4	8	6	8	8	2
5	8	6	5	3	5	5	1	3	3	2	2
6	8	7	6	7	8	6	2	5	4	6	1
7	9	7	6	8	2	7	1	6	4	3	1
8	7	6	5	5	7	8	2	2	3	3	1
9	5	6	6	5	3	9	7	6	4	4	5
10	9	3	4	5	1	10	6	6	6	5	4
11	7	6	5	6	6	11	8	6	5	6	3
12	9	6	4	5	7	12	5	3	8	4	2
13	9	7	7	8	10	13	5	5	2	5	2
14	8	7	10	8	7	14	5	5	5	2	4
15	7	5	8	6	3	15	2	6	5	4	6
16	8	8	10	6	5	16	1	6	7	2	6
17	9	6	10	6	6	17	6	4	4	7	1
18	8	6	7	5	5	18	6	5	8	7	5
19	8	4	5	7	5	19	1	4	3	6	6
20	3	5	5	4	5	20	6	5	5	3	3
Average	37.75	18.45	12.3	23.6	5	Average	20.75	14.25	9.5	17	3.5

Table1. Teacher number one's evaluation

trained	creativity	producible	environmental friendly	detail	plurality of concepts	non trained	creativity	producible	environmental friendly	detail	plurality of concepts1
1	9	4	3	8	10	1	1	10	1	7	1

2	9	8	1	10	7	2	1	7	2	4	1
3	8	7	2	10	10	3	5	9	5	4	4
4	10	9	7	10	9	4	5	9	2	8	3
5	8	4	1	10	6	5	3	9	1	4	4
6	9	8	5	10	10	6	2	8	1	4	1
7	9	7	7	7	10	7	2	8	1	8	5
8	6	4	2	10	10	8	2	9	1	6	3
9	4	8	1	3	5	9	4	7	3	6	5
10	5	7	1	6	6	10	6	8	2	5	4
11	9	9	2	10	9	11	4	5	1	4	2
12	8	4	2	10	8	12	2	2	1	5	2
13	10	3	8	10	10	13	3	7	1	5	5
14	5	7	7	10	7	14	6	6	2	2	6
15	6	8	1	8	2	15	7	9	2	4	8
16	8	7	8	8	6	16	7	7	1	8	5
17	5	2	7	10	10	17	4	5	7	5	1
18	7	7	4	10	9	18	3	4	1	8	4
19	6	5	1	10	9	19	6	8	1	3	7
20	4	8	2	8	10	20	2	6	1	5	3
Average	36.25	18.9	7.2	35.6	8.15	Average	18.75	21.45	3.7	21	3.7

Table2. Teacher number two's evaluation



Figure 1. Creativity difference

Figure 2 shows the difference for the producible factor. There is not much difference and average high for both is 7.5.average low for trained ones was 4 and for none trained was 1.



Figure 2. Producible factor

Results obtained for Plurality of concepts is as follows: high average for T-students was 10 while for N-students was 7.Low average for T-students was 2.5 and for N-students 1.



Figure 3. Plurality of concepts

Table 3 and figure 4 shows the comparison of average obtained for these 4 estimating factors .the comparison was done considering the ratio given to each factor based on its importance in evaluation process

	creativity	producible	Environmental friendly	detail	concepts
trained	37	18.675	9.75	29.61	6.575
non trained	19.75	17.85	6.6	19	3.6
Ratio	1.87	1.04	1.47	1.55	1.82

Table3. Comparison of average



Figure 4. Comparison of average

4. Conclusions

The result shows that T-students had a better performance in design process.

More concepts with more creativity (approximately 2x) show the difference. Also paying attention to the details is the other advantage of being trained for design as it was clear in the results. Environmental issues are seen more in their sketches. Producible factor average in both groups was similar and showed that both groups had shown interest in the possibility of making the designs. Students are far faster and more innovative. They are courageous enough to present wide, varied and creative ideas and creativity is more important to them than other issues. Design education, as a subject, seems to offer something unique, a tool for creating connections between ideas, information, people and objects and, according to Buchanan, "It integrates and connects knowledge in new and useful ways." Science and math are only part of the solution. To stay competitive in a changing world, we need to think with our hands.

5. Acknowledgements We are very grateful to Dr. Seyed-Reza Mortezaei, for reviewing the paper and his great comments about the whole .We are indebted to students and officials at Farzanga2 and Saba high schools for their unwavering cooperation

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