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Design Thinking impact on Creative Thinking

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ABSTRACT

This paper is based on student convergent thinking process in design thinking. Continuous practice of design thinking process studentsshowed improvement on creative thinking. Students considered are STEM and NONSTEM specialization. This experiment is conducted to understand student improvement in creative things through SPM test. Design thinking workshops are conducted with respect to students interest and post the workshop again SPM test is conducted to understand the SPM results. Student result are compared with their academic performances . Results show that academically high performing students SPM results were low and academically low performing students have high SPM results.

KEYWORDS: *Creative Thinking, Design Thinking, Convergent thinking process*

INTRODUCTION

Creative thinking is the basis of innovation in every field including arts, science and technology. Creative processes are generally regarding as spontaneous and difficult to measure and study under observable conditions. Based on the understanding formed over the last 20 years, it is believed that moderate forms of creativity can be measured through scientific observation.

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MOTIVATION

Over the period of my student engagement, I observed that varied creative thinking abilities, student engagement levels and academic performance.

There seem to be a strong correlation between creative thinking ability and affinity to come up with innovations and exhibit independent, out of the box thinking and respective student engagement levels with academicians.

This experiment was designed to demonstrate above correlation with a tangible and verifiable result set providing actionable information.

OBJECTIVES

To emphasize the significance of design thinking in technology education using convergent thinking process

APPROACH TO RESEARCH PROBLEM

Use Participants (Sampling techniques, description of the participants, e.g. Age, Handedness, Socio-economic level etc.)

- STEM (Science Technology Engineering and Mathematics) and NON STEM 1st year student group who lack fallback strategies and not exposed to any design thinking trainings

- 30 1st year (Group A) STEM students (all female) participated in design thinking training and have taken pre

and post SPM tests

- 30 1st year (Group B) NONSTEM students (all female) participated in SPM test without design thinking training and have taken pre and

  post SPM tests

- Age: 17-18

DESIGN / PROCEDURE

Step 1: Conduct SPM standard progressive matrices test to access convergent abilities in creative production before Design thinking training and record scores

Step 2: The participants were formed as six teams of five members each. Clear guidelines of how to find the right problem statement exhibiting distinct divergent and convergent behavior before arriving at problem statement were given. The same process / procedure was asked to be followed to arrive at right solution (Final convergent point)

Two design thinking workshops have been conducted on subjects in two different problem spaces

Define problem concerning self – Academic or personal problem and arrive at most important problem at group level (First convergent point), identify multiple solutions with in group and converge to a final most effective solution (Final convergent point)

Logo designing: Participants were given written guidelines to design a new logo for their college.

Participants had to go through the process of

Research. Conduct a brief search on internet and focus on the institution itself and its history.

Reference. Conduct a brief search on internet on logo designs that have been successful and current styles and trends that are related to the design brief.

Sketching and conceptualizing. Develop the logo design concepts around the brief and research.

Reflection. Allow your ideas to mature by brainstorming in the group and receive feedback.

Presentation. Choose to present only one logo. Get feedback and repeat until completed.

Three end products of Design thinking workshop

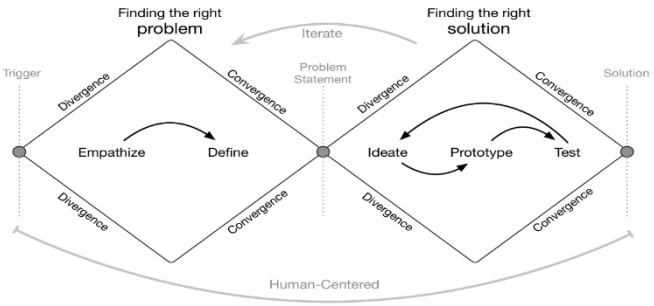
Running Design thinking workshops

Double diamond model of design thinking:

First Diamond (Finding the right problem) - Empathize, define, arrive at problem statement,

Second Diamond (Finding the right solution) – Ideate, protype and test

(iterative) find the solution



Step 3: Conduct different variant of SPM standard progressive matrices test on same subjects post design thinking training and record scores.

MEASURE OF THE PERFORMANCE

Pre SPM and Post SPM test scores were compared and following are the observations

73% of the students have shown improvement in their SPM scores post design thinking training.

27% of the students have lesser scores compared to pre design thinking test

Controlled group (No training group) – No coherent data pattern observed

56 % of students have scored less compared to SPM pre test

27% of students have not shown any

change in SPM post scores

17% of students have shown slight improvement in SPM post score

RESULTS

Description of the scope of the analysis

Enhanced Creative thinking ability by imparting design thinking training

Insights to design appropriate academic curricula to improve student's cognitive engagement levels

Insights to faculty towards understanding student deviant academic behavior

Data representation (e.g. Figure, table, graph etc.)

Trained on Design Thinking - SPM score improvement			
Percentage SPM Score Improved			**73%**
Student No	**Pre**	**Post**	**Improvement on SPM Score**
1	18	28	10
2	19	28	9
3	17	25	8
4	11	18	7
5	21	28	7
6	21	28	7
7	22	28	6
8	17	23	6
9	23	28	5
10	24	28	4
11	24	28	4
12	17	20	3
13	20	23	3
14	15	18	3
15	23	25	2
16	23	25	2
17	26	28	2
18	24	25	1
19	19	20	1
20	24	25	1
21	27	28	1
22	22	23	1
23	23	23	-1
24	24	23	-2
25	28	25	-3
26	21	18	-4
27	24	20	-4
28	24	20	-4
29	26	20	-6
30	26	15	-11

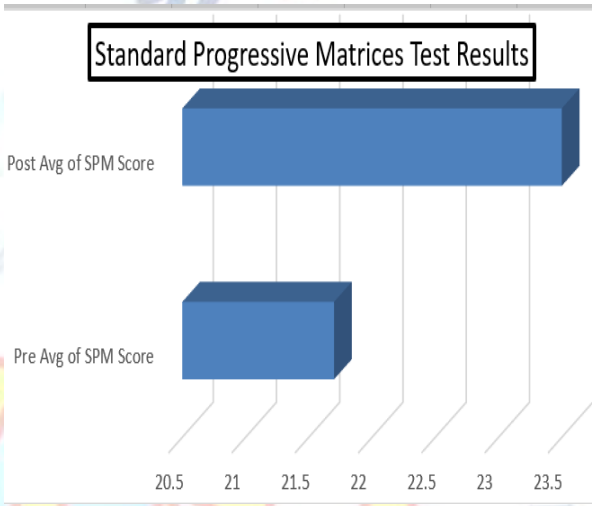
Paired T-Test result: P = 0.049

(Below 0.05 significantly different values and shows strong evidence against the null hypothesis)

Dependent variable: Performance Score

Independent variable: Training – Design thinking

t (29) = 2.059, P= .049



DISCUSSION

How the current results contribute to knowledge in the field?

Experiment inferences provided valuable insights to design appropriate academic curricula to improve student's cognitive engagement levels

Actionable information for faculty to better understand student deviant academic behavior

Compare the current results to the literature

Experiment results corroborate with following referred literature and their key findings

Creative Thinking, Values and Design and Technology Education HOWARD MIDDLETON

"Development of design and technology curricula has always been premised on the importance of the act of designing and of the value of the contingent activity of creative thinking".

Creative reasoning across developmental levels: Convergence anddivergence in problem creation

Sketches from a Design Process: Creative Cognition Inferred from Intermediate Products

Saskia Jaarsvelda

"Convergent and divergent abilities in creative production can be assessed independently with in same knowledge domain as classical problem solving"

Assessing Creativity: The Test for Creative Thinking-Drawing Production (TCT-DP) - Urban, Klaus K.

"By means of high TCT scores and the case studies teachers saw their students with other eyes and did no longer consider their deviant behavior as totally negative. This function and effect mark an important field for an educationally oriented application of the TCT-DP."

CONCLUSION

Major findings of the current project/work Enhanced Creative thinking ability by imparting design thinking training observed In line with afore referred literature (Section: 2 Literature Review) the experiment results provide valuable and actionable insights to following To design appropriate academic vv curricula to improve student's cognitive engagement levels To faculty in understanding student's deviant academic behavior in a better way

Limitation / Future direction

Experiment to be repeated for male participant of same age

Divergent abilities test to be conducted for both female and male participants to conclude that convergence and divergent abilities are independent in creative production

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