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Research on Correlation of Self-Confidence and Creativity

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자신감(자기효율성)과 창의력의 상관관계 연구

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Abstract The purpose of this study is to first define self-confidence (self-efficacy) and evaluate importance of creativity of designers, then investigate correlation between the two values. While creativity is a crucial element of design process, for novelty is an essential element of a great design, many believe that self-confidence is one of the major sources of creativity. An experiment consisted of questionnaires and creativity tests have suggested that there is no clear relationship between the two values. Nonetheless, the two values are still driving forces of one's motivation, which could ultimately lead to a designer's success.

Key Words : Creativity, Confidence, Divergent Thinking, Self-Efficacy, Flow

요 약 본 연구는 자신감의 뜻을 정의하고 디자이너에게의 창의력의 중요성을 알아본 후 두 요소 사이에 상관관계가 있는지를 찾는 것을 목표로 하였다. 좋은 디자인에는 새로운 발상이 요구되므로 창의력은 디자인 프로세스에 중요한 요소이이며, 많은 이들이 자신감이 창의력을 키워준다고 믿는다. 설문조사와 창의력 테스트를 동반한 실험결과 두 요소 사이에 뚜렷한 상관관계가 없는 것으로 나타났다. 하지만 두 요소가 누군가의 동기부여에 결정적인 역할을 해 디자이너로서의 성공에 관여한다는 것은 변함없는 사실이다.

주제어 : 창의력, 자신감, 발산적 사고, 자가효율성, 몰입

1. Introduction

1.1 Introduction

"Here's to the crazy ones. the misfits. the rebels. the troublemakers. the round pegs in the square holes. the ones who see things differently... the people who are crazy enough to think they can change the world are the ones who do."

-Steve Jobs

How do people remember Steve Jobs? He was a true pioneer of design and technology, the one who has ultimately changed our lives. Phones are no longer just phones, they are smart. Smartphones run this world, and it was no other but him who created this concept and realized it. He truly lived up to his words and changed the world.

What does the quote tell us? The craziness mentioned in the quote could be interpreted as confidence; he's stating that only the people who have the strong level of confidence, enough to change the world, can do so.

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It is a general norm to encourage one to be confident; many believe that self-confidence is a key to success in life. For example, it is a common notion amongst sportsmen that self-confidence is one of the key requisites to athletical success. Research has demonstrated self-confidence to be one of the most influential cognitive determinants of athletic performance[8]. Design field also has the tendency to emphasize on importance of confidence. “Belief in your creative capacity lies at the heart of innovation,” said Thomas and David Kelley of IDEO, the pioneers of design thinking. Brendan Patrick Blowers, a creative consultant and theater director, has claimed that creativity is a natural state of mind for all humans, and self-doubt is a tether that will keep one’s creativity down[9]. These statements are intriguing, since they hint that there is a positive correlation between confidence and creativity.

This study aims at finding the link between self-confidence and creativity amongst designers, hoping to be an opportunity to encourage one to grow the necessary trait to improve oneself as a designer.

2. Background

2.1 Creative Confidence

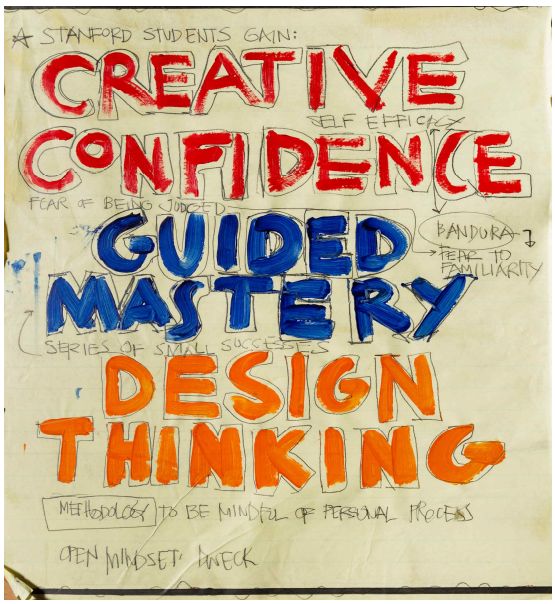

Fig. 1. David Kelley’s Creative Confidence Map

Hasso Plattner Institute of Design at Stanford University, where David Kelley has taught, describes its goal as to give students creative confidence, an idea similar to what Bandura calls "self-efficacy," the ability to do what one sets out to do, in her own way, even while facing ambiguous circumstances[11]. They also state that the core trait that holds people back is fear: fear of failure, fear of being judged[11], and they encourage students to overcome the daunt. Creative Confidence is a book written by David and Thomas Kelley. While the purpose of the book is to educate the public that everyone can be creative thinkers, not just those in artistic realm, the core belief behind it is believing in your ability to create change in the world around you[12]. This ‘belief in ability to create change’ can be equated to confidence, or more precisely, self-efficacy.

2.2 Self-Efficacy

Upon close inspection of figure 1, one can notice that David Kelley had personally written down ‘Bandura’ and linked it to ‘self-efficacy.’ Self-efficacy, a term coined by psychologist Albert Bandura of Stanford university, is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives[13]. Compared to self-confidence, it is focused on a specific circumstance. His theory is that the higher the self-efficacy, or one’s confidence in ability to perform, the more likely for the individual to view a given task as a challenge rather than an obstacle, thus gaining motivation to achieve it and succeed. He is the most prominent figure who has linked confidence with performance. Bandura has also proposed that the 4 ways of gaining self-efficacy is first, to have mastery experience, second, to observe a role-model’s success, third, to get social persuasion, and lastly, to ensure well-being of somatic and emotional status. After an

encounter with Bandura, Kelley has applied the theory to creativity and developed it further.

2.3 Hierarchy of Needs

Another theory that shows link between self-confidence and creativity is hierarchy of needs theory by Abraham Maslow, an American psychologist. Maslow proposed that a human's need has 5 levels of hierarchy.

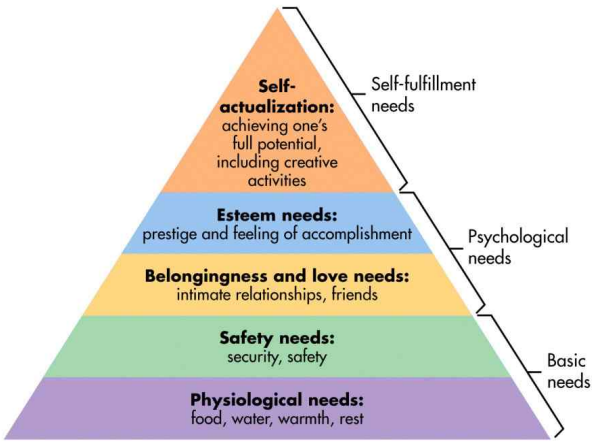

Fig. 2. Maslow's hierarchy of needs

Figure 2 shows each stage of needs. The bottom of the pyramid are basic needs, such as physiological needs and safety needs. The center of the hierarchy is need for belongness and love. Needs for esteem and self-actualization are placed above. Maslow has theorized that the needs lower down in the hierarchy must be satisfied before individuals can attend to needs higher up[14]. Therefore, in order for one to feel the need of self-actualization, the need to express oneself creatively, he needs to fulfil the need of feeling accomplished and gain self-confidence.

2.4 Creativity

Creativity is a crucial element of design process. It is the creative element that is the less common, less taught, less understood, yet more desired and influential aspect of design[10]. The modern definition of creativity has shifted from a focus on aesthetics towards practicality—hence why Kelley has stated that creativity is not reserved to those of aesthetic field. Nonetheless, the idea of novelty is still central, although not sufficient[10]. There are currently no methods to evaluate one's creativity accurately, but there are tests that could provide relevant estimates. Divergent thinking tests, such as Guilford's Alternative Use Task and Torrence's Creativity Test are few of them. Divergent thinking is defined as an ability to make connections between ideas and gain a sudden insight or inspiration, which is often what creativity is defined as.

While as Kelley has stated that creativity is not the sole trait of individuals in aesthetic field, it is a must-required trait amongst designers, often being the key to better design performances.

2.5 Confidence

Self-confidence is a trait that has broader definition than self-efficacy. Contrary to self-efficacy, confidence is not restricted to a being in a specific situation or taking a certain action.

2.6 Hypotheses of The Study

The study is going to deem self-efficacy as skills confidence; a belief in ability to perform design tasks successfully. Creativity will carry its general definition and be defined as a catalyst of innovation. However, it would also be viewed as a designer's performance; ability to generate positive results. A designer's success is enigmatic to be defined. Since creativity is an element that affects a designer wholly, it may indicate a designer's performance level. Self-confidence will be viewed as a general trait; a person's overall belief in himself. The study seeks to prove 2 hypotheses: A. the more confident one is in his skills as a designer, the more confident he would be in his ability to succeed in design career and B. the more confident one is, the more creative one would be.

3. Experiment and Evaluation Method

3.1 Experiment Method

The experiment aimed to search for a relationship between confidence and creativity by measuring two items; **A.** Relation between skills confidence and success confidence and **B.** Relation between creativity and general self-confidence. Skills confidence tests were initially conducted to measure a designer's self-efficacy. Success confidence inventories followed, to estimate participants' confidence to succeed in career. Then skills and success confidence were compared to if self-efficacy would ultimately improve one's will to succeed, potentially leading to more chance of professional success. Afterwards, the 2 scores were combined to show a participant's general confidence level. Each participant's confidence score was compared to his creativity scores, estimated through modified version of alternative task test.

3.2 Participants

Fig. 3. Jakob Nielsen's Curve

Jakob Nielsen's research on usability testing sets the number of usability problems found in a usability test with n users as N(1-(1-L)n), where N is the total number of usability problems in the design and L is the proportion of usability problems discovered while testing a single user[6]. According to the research, an experiment can have a reliable result when it is conducted to 5 or more people, finding 85% of the problems. This experiment was conducted in a form of a written test with 3 sections, administered to 18 participants. All participants were either professional designers or design university students. Prior to the written test, some background information on participant was collected: age, gender, and nationality. There were 3 males and 15 females with age ranging from 18 to 42. The ratio between Koreans and non-Koreans were 50:50. The non-Korean group constituted of 4 Americans, 1 Brazilian, 1 Canadian, 1 Portuguese, and 1 Saudi Arabian.

3.3 Method of Experiment

3.3.1 Section 1 - Creativity Test

Section 1 was a modified version of J.P. Guilford's Alternative Uses Task (1967) to measure creativity, inspired by Caitlin Dippo. Alternative Uses Task, a part of Guilford's Structure of Intellect (SOI), is a simple test utilized to estimate one's divergent thinking ability, or what he stated as "spontaneous flexibility"[1]. The test asks participants to list non-obvious uses for an everyday object, such as a brick, in a fixed amount of time[1].

Contrary to the original Alternative Uses Task, which limits the number of responses to 6, Dippo removed the quantity limit. Her research found out that later responses were significantly more novel than early responses and unoriginality of responses exponentially decreased with quantity at a rate of x-1/2 (r2=.94)[2]. By removing the quantity limit, participants were given more room for creativity, which would result as more accurate results on creativity measurement. For this study, participants were asked to "list as many alternative uses for a paper clip they can in 3 minutes"[2].

3.3.2 Section 2 - Skills Confidence Test

Section 2 was a skills confidence questionnaire devised to estimate participants' confidence in design skills. Each person was prompted to choose a statement he relates more to and select the degree of sympathy as "very true" or "somewhat true."

For example, one of the questions asks a participant to choose between statement 1 ("I feel I am not very good at designing") and statement 2 ("I feel I am really good at designing"). If he felt statement 1 was very true for him, he chose A. If only somewhat true for him, chose B.

3.3.3 Section 3 - Success Confidence Test

Section 3 was altered version of Vealey's Trait Sport-Confidence Inventory (TSCI) to measure one's confidence in ability to succeed. TSCI, developed by R. Vealey in 1986, assesses athletes' confidence in general during sports competitions[3,4]. The inventory includes 13 items that questions participant's confidence in ability to succeed in certain situations by comparing himself to the "most confident athlete (he) knows"[3]. The inventory consists of 13 items, with no subscale components, utilizing a 9-point Likert scale anchored by 1 (low) and 9 (high)[5].

The inventory was modified to excluded all the "comparison" section of the questions. For example, if the original question read "Compare your confidence in your ability to execute the skills necessary to be successful to the most confident athlete you know,"[3] it became modified to "How confident are you in executing the skills necessary to be successful as a designer?" While it is true that Bandura has suggested that a role-model can be a source of self-efficacy, this still seemed like a necessary measure for 2 reasons; first, not everyone has a designer role model, and second, design is a field that exercises one's unique abilities and styles.

3.4 Evaluation

3.4.1 Creativity Evaluation

Creativity score was evaluated by rating and totaling four components; originality, fluency, flexibility, and elaboration, following the rubric for Guildford's Alternative Task (1967). Originality was scored based on the frequency of the answer's appearance. Reponses that were given by 5% of the group were awarded 1 point, and responses that were given by only 1% of the group were considered unique, thus given 2 points. Fluency was the number of responses. 1 point was given per response. Flexibility was the number of different categories. Elaboration examined the amount of details, which added 1 point per detail. For an instance, "a door stop to prevent a door slamming shut in a strong wind" as a brick's alternative use, would be awarded 2 points (one for explanation of door slamming, two for further detail about the wind)[7].

3.4.2 Skills Confidence Evaluation

There were total of 10 items for skills confidence questionnaire. Each question's score ranged from 1 to 4 points. The highest score (4 points) were awarded to the "very true" of a positive statement, whereas the lowest score (1 point) awarded to the "somewhat true" of negative statement. Minimum score was 10 and maximum was 40.

3.4.3 Success Confidence Evaluation

TSCI's scores are obtained through a mean or a sum of scores for the 13 items. In this experiment, the latter method of summing up all the items was chosen. Global confidence summed scores between 13 and 39 reflect a low level and scores between 91 and 117 signify a high level of overall competition confidence. Global confidence scores in between those extremes represent a moderate level of confidence[5]. Cronbach's alpha coefficient was measured as .93 for the TSCI, with test-retest reliability in two studies of .83 and .86, respectively [3].

4. Results and Analysis

4.1 Summary of Test Results

Table. 1. Creativity scores

No.	Originality	Fluency	Flexibility	Elaboration	Total
1	4	9	7	0	20
2	4	14	10	3	31
3	0	6	5	2	13
4	2	8	8	1	19
5	0	4	4	0	8
6	2	5	4	3	14
7	2	5	5	0	12
8	0	5	5	0	10
9	4	9	7	3	23
10	6	10	9	2	27
11	2	10	7	1	20
12	0	5	4	0	9
13	6	10	9	3	28
14	2	8	6	2	18
15	0	4	4	0	8
16	4	8	8	6	26
17	4	15	13	4	36
18	4	13	10	7	34

There were total of 152 responses given by 18 participants for the modified Alternative Uses Task. The average number of responses for creativity test was 9, whereas the median was 8. Highest number of responses was 15, and lowest was 4. The most frequently appeared answer was "to bind pieces of paper together." Unique answers included 'make a spring' and 'making fire with two batteries while lost in amazon.' Answers given by 1% of the group, or only appeared once, were given 2 points for originality. Answers given by 5% of the group, or only appeared 7 times or less, were given 1 point for originality. With all the factors calculated, the creativity test score ranged from 8 to 36, 20 being the mean score.

Skills confidence scores ranged from 27 to 35, with the average score being 30 and median as 29. As for success confidence, lowest score was 61 and highest was 106. Average was 84 points and median was also 84 points.

Overall self-confidence scores were calculated by summing skills confidence and success confidence scores. The average self-confidence score was 112. 9 out of 18 participants scored lower than average. All participants who scored higher than the average skills confidence also scored higher than average on success confidence.

Fig. 4. Skills and Success Confidence Relation

As shown in figure 4 above, it was found out that there is an evident correlation between skills and success confidence. The more confident one is in his skills, the more confident he would be in succeeding in his career, hinting that self-efficacy may boost one's will to advance further.

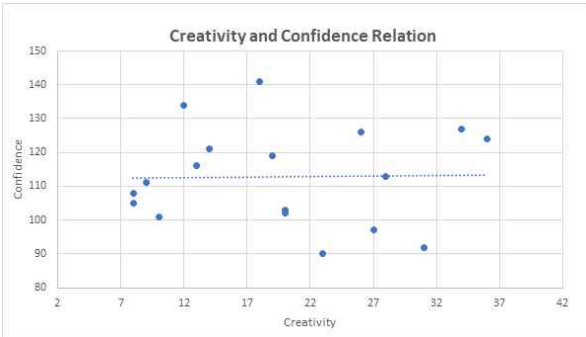

Fig. 5. Creativity and Confidence Relation

However, for creativity and confidence, it was hard to state that a clear relationship has been identified between the 2 values. While the graph(figure 6) exhibited a positive trend line, the slope of the line is extremely low, almost parallel. The points in scatter plot also failed to form a cluster or show an evident trend. Furthermore, out of 9 participants who scored higher than the average on creativity test, 5 of them scored average or below on both confidence

tests. The experimentee who has scored the highest on both skills and success confidence inventories have scored below the mean on creativity score. Meanwhile, 4 out of 18 participants scored higher than average on all 3 tests, and 2 among them scored the highest on creativity test. Due to the mixed results, it would be safer to conclude that there may be no significant relationship between a designer's confidence and creativity.

5. Conclusion

This experiment was conducted to search for a relationship between creativity and confidence, inspired by theories of Albert Bandura, David Kelley, and Abraham Maslow. Bandura has stated that confidence, or self-efficacy, has a positive correlation with one's performance level. Kelley has developed this theory further and suggested that creativity may also have be linked to self-efficacy. Maslow has stated that a person would not feel the need for self-actualization, which involves creative activities, without fulfilling his need for self-achievement in prior. 2 hypotheses were set up. First hypothesis stated that the more confident one is in his design skills, the more confident he would likely be towards success in career. Second hypothesis was the more confident one is, the more creative he would be. Results revealed hypothesis A as valid, and hypothesis B as invalid. While both figures exhibited positive trend, the data for creativity and confidence failed to show a definite relationship between the 2 values.

The results hint that self-efficacy may actually play a significant role in developing one's will to advance in his career. This may be due to the fact that if a designer has high belief in his own skills, he would believe that he is more capable of achieving greater designs. This indicates that having high self-efficacy could aid a person in achieving his career goals.

On the contrary, creativity and confidence failed to show any clear relation between the 2 traits, suggesting that creativity and confidence are independent from each other. However, 4 out of 18 participants did score higher than average on all 3 tests, with 2 of them scoring the highest on creativity test. This may indicate that the theory may still be true—just that the other participants with high creativity scores may not have had the chance of developing healthy level of self-confidence. Our society nowadays is becoming more and more less-forgiving environment. While facing numerous problems on daily basis, financially, educationally, and more, they are thoroughly educated to 'never fail,' forgetting that success can never occur without trials and errors.

However, what the results suggest is that designers may not necessarily have to worry about the level of their confidence. As in, contrary to the general belief, it is alright even if one is not as confident as the society 'recommends' him to be. Bill Burnett and Dave Evans of Stanford Life Design Lab, who apply design thinking methodology on people's lives, educates their students on concept of dysfunctional belief. Dysfunctional beliefs are conventional beliefs that causes one direct or indirect mental, emotional, or physical harm [15]. They teach their students to find and accept the dysfunctional beliefs in their lives and "reframe" them to gear their minds to have more positive psychology. For example, one of the common dysfunctional beliefs is that "A person must strive to be the best." This statement could be reframed as "Best is the enemy of many betters." For this experiment, "Designers must be confident" may have been the dysfunctional belief. And the results of the experiment are hinting us to reframe the hypothesis as "do not worry about having low-confidence." Since, confident or not, us designers still have the brilliant creativity to express ourselves freely, bringing new insights to this world. It is a lesson for all of us that implies what matter is what we have, not what we lack.

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