

# The Relationship Between Individual Traits and CPE for Universal Creativity Education Program Design

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## Abstract

The main challenge for creativity education is to improve practice of whom lack overall engagement in creative activities. Understanding which process is comfortable for such persons will be essential for designing a universal creativity education. A quantitative survey was conducted to construct zoom-in models on the relation between individual traits and CPE (creative process engagement).

## Keywords

creative process engagement, individual traits, universal creative education design

## 1. Introduction

This paper proposes models regarding the relation between individual trait and CPE (creative process engagement). Creativity education uniformly promotes enthusiastic and outgoing attitudes, such as active fieldwork for information gathering, flexible brainstorming, and intensive collaboration with individuals from different disciplines. However, these trainings may primarily benefit individuals who are naturally inclined towards such activities, leading to a tautological outcome that "a creatively gifted person is inherently creative." The fundamental mission of such education should be to enhance the creativity of individuals facing greater challenges.

Recognizing this issue, we must begin by understanding which traits of individuals are associated with their original engagement in each stage of the creative process: namely, problem identification, information searching and encoding, and idea generation [1]. Every individual is likely to have strengths and weaknesses at each stage of this process. While these stages have often been lumped together in previous studies [1] [2] [3] [4] [5], identifying which stages are more comfortable for individuals who generally lack overall engagement in creative activities will be crucial for designing a universal creativity

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education program. As an initial step in this endeavor, this paper conducts a quantitative survey to construct detailed models examining the relationship between individual traits and CPE.

## **2. CPE and Individual Traits**

### **2.1. CPE**

CPE was initially defined and measured as a latent variable with a positive effect on individuals' creativity [1], which based their proposal on Amabile's assertion that creative individuals follow a typical procedure involving problem identification, information searching and encoding, and idea generation [6]. In addition to these three components, we propose expanding CPE by incorporating two additional stages: idea selection and idea execution. The concept of idea selection refers to the stage of identifying appropriate ideas after idea generation. In creative thinking, the stage of idea generation, which involves individuals generating a diverse array of ideas abundantly, representing divergent thinking, is insufficient on its own. The importance of the convergent process stage, which involves evaluating and narrowing down ideas, has been emphasized [7]. The other step, idea execution, involves activities aimed at persuading and involving others to bring a selected idea to fruition [8]. The act of obtaining cooperation from others is essential to materialize ideas. Therefore, we propose reinterpreting CPE as a latent variable composed of engagement across these five stages.

### **2.2. Effects of Individual Traits**

Among the Big Five traits, the positive effect of Openness towards CPE as an integrated variable with the original three steps of the creative process has been clearly examined [2]. Individuals who have high openness tend to be attracted by ambiguous and open-ended challenges and require different experiences. Building on the previous studies, openness is expected to influence every step of the creative process.

H1: Openness has a positive impact on engagement in every stage of the creative process.

Conscientiousness is expected to affect certain stages of the creative process that require patience. The dual pathway to creativity model was proposed from a plenty of research reviewing, suggesting that creativity outcomes are achieved through two different cognitive styles: flexibility or persistence [9]. Within the five stages of the creative process, information searching (and encoding) and idea selection are considered to require patience compared to the other tasks, as immediate results may not be apparent. Individuals high in conscientiousness, who can work diligently and patiently over the long term, are likely to engage in information searching (and encoding) and idea selection, which require time for outcomes to materialize.

H2: Conscientiousness has a positive impact on engagement in information searching (and encoding) and idea selection.

The last step of the creative process, idea execution, would be an activity at which extraverted individuals excel. Their outgoing and sociable personalities make them well-suited for activities that involve persuading and engaging others to bring selected ideas to fruition.

H3: Extraversion has a positive impact on engagement in idea execution.

In addition to Big Five traits, we focus on the relation between regulatory focus [10] and engagement in each step of the creative process. Individuals with a promotion focus are said to possess high adaptability and are associated with high levels of creativity [11] [12]. Similarly to openness, individuals with promotion focus, who pursue positive outcomes to achieve their goals, are likely to engage in all steps of the creative process from the outset.

H4: Promotion focus has a positive impact on engagement in every step of the creative process.

Traditionally, prevention focus has been understood as inhibiting creativity in contrast to promotion focus. However, nowadays, there is growing recognition of a relationship between prevention focus and creativity [13]. Individuals with a prevention focus, who aim to avoid uncertainty, must engage partially in activities to mitigate risk. In this perspective, information searching (and encoding) and idea selection are steps aimed at reducing the risk of idea failure. By consulting a wide range of existing information, preventing the emergence of stale ideas, and carefully selecting ideas, this process contributes to increasing the survival rate of ideas.

H5: Prevention focus has a positive impact on engagement in information searching (and encoding) and idea selection.

### **3. Method**

#### **3.1. Research Setting and Participants**

From a Japanese traditional imaging and electronics company, a total of 109 samples were collected from the employees involved in R&D for this survey. We utilized a web-based anonymous survey tool to collect data to uncover participants' true feelings. To reveal which stage of the creative process individuals inherently engage with, participants were asked to respond to questions regarding their engagements in current projects.

#### **3.2. Measures**

##### **3.2.1. Creative Process Engagement**

Five observed variables were used to measure individuals' Creative Process Engagement (CPE): problem identification, information searching (and encoding), idea generation, idea

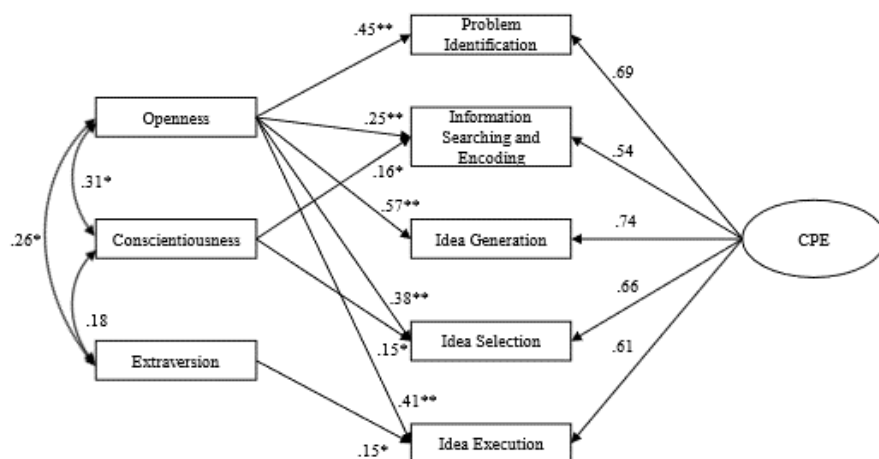
selection, and idea execution. An 11-item scale to measure the former three variables was adapted from [1], who originally indicated CPE as a latent factor. The latter two variables, idea selection and idea execution, were added to complete the individual creative process for realizing innovation. Each three-item scale was developed for this study to measure those two expanded processes based on [6] [8]. Respondents answered on a five-point scale ranging from “never” to “very frequently.”

### 3.2.2. Individual Traits

A 29-item scale to measure Big Five traits (Extraversion/ Conscientiousness/ Neuroticism/ Openness/ Agreeableness) was adopted from [14]. Respondents answered on a five-point scale ranging from “strongly disagree” to “strongly agree.” Regulatory focus (Promotion focus, Prevention focus) was measured with a 10-item scale developed by [15]. Respondents answered on a seven-point scale ranging from “strongly disagree” to “strongly agree.”

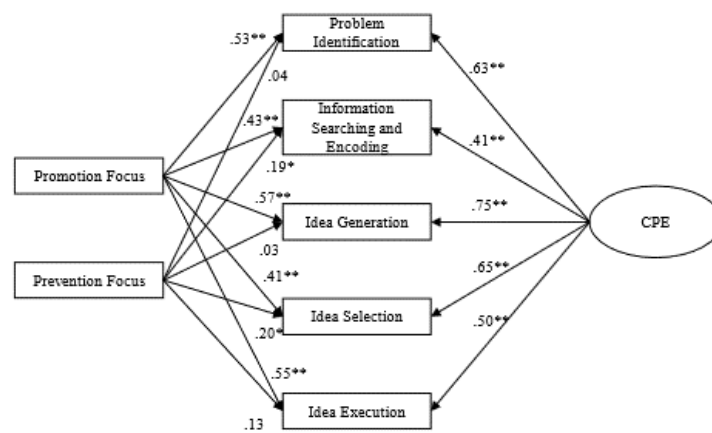
## 4. Results

The relationship between each creative process and individual traits was examined through structural equation modeling (SEM). The structural modeling results concerning the Big Five traits suggested that the hypothesized model in Figure 1 fit the data well ( $\chi^2/df = .627$ , CFI= 1.000, GFI= .986, AGFI= .933, RMSEA= .000). Hypothesis 1 states that openness has a positive impact on engagements of every step of the creative process. Our results supported this view (problem identification;  $\beta = .45$ ,  $p < .01$ , information searching and encoding;  $\beta = .25$ ,  $p < .01$ , idea generation;  $\beta = .57$ ,  $p < .01$ , idea selection;  $\beta = .38$ ,  $p < .01$ , idea execution;  $\beta = .41$ ,  $p < .01$ ). Hypothesis 2, which suggests that conscientiousness is positively related to engagements in information searching (and encoding) and idea selection, was also supported (information searching and encoding;  $\beta = .16$ ,  $p < .05$ , idea selection;  $\beta = .15$ ,  $p < .05$ ). Hypothesis 3, which states that extraversion is positively related to idea execution, received support as well ( $\beta = .15$ ,  $p < .05$ ).



**Figure 1:** The overall structural model with path coefficients regarding the relationship between big five traits and each step of the creative process (\*  $p < .05$ , \*\*  $p < .01$ )

Structural modeling results regarding regulatory focuses also suggested that the hypothesized model in Figure 2 fit the data well ( $\chi^2/df = .905$ , CFI = 1.000, GFI = .986, AGFI = .933, RMSEA = .000). The results support Hypothesis 4, indicating that promotion focus is positively related to engagements in each of the five steps of the creative process (problem identification;  $\beta = .53$ ,  $p < .01$ , information searching and encoding;  $\beta = .43$ ,  $p < .01$ , idea generation;  $\beta = .57$ ,  $p < .01$ , idea selection;  $\beta = .41$ ,  $p < .01$ , idea execution;  $\beta = .55$ ,  $p < .01$ ). Additionally, Hypothesis 5 prediction that prevention focus is positively related to engagements in information searching (and encoding) and idea selection is supported as well (information searching and encoding;  $\beta = .19$ ,  $p < .05$ , idea selection;  $\beta = .20$ ,  $p < .05$ ).



**Figure 2:** The overall structural model with path coefficients regarding the relationship between regulatory focuses and each step of the creative process (\*  $p < .05$ , \*\*  $p < .01$ )

## 5. Discussion

Our results show differences in the original engagement with each step constituting the creative process due to individual traits. Openness and promotion focus have positive influences on all steps, whereas conscientiousness, extraversion, and prevention focus were found to have positive effects on only some steps. It suggests that in creativity education, the focus should not solely be on individuals who already possess high levels of openness or promotion focus and are highly engaged throughout all stages. Instead, it should also cater to those who may initially have partial engagement, providing them with opportunities for receiving recognition and ultimately fostering engagement across all stages of the creative process.

A hint for designing such educational methods lies in the differences in nature between three steps constituting the problem identification, idea generation, and idea execution, and the two steps of information searching (and encoding) and idea selection within the creative process. The former three steps tend to attract attention and offer immediate gratification

as they involve proposing ideas where recognition and praise from peers can be readily obtained. Conversely, the latter two steps may not receive immediate acknowledgment as their outcomes are not immediately recognized. Information searching (and encoding) serves as preparation for idea generation and may not directly contribute to generating good ideas at the time, as well as idea selection involves assessing whether chosen ideas will succeed, which takes time. Thus, although essential for mitigating the risk of idea failure, these steps are perceived as activities requiring time and patience.

In creativity education, it is necessary to allocate time not only for engaging in activities such as problem identification and idea generation, which are easy to tackle and exciting without prior preparation but also for input through information searching (and encoding) and emphasis on methods for idea selection as preparatory steps. By providing opportunities for individuals with inherently high engagement, such as those with high conscientiousness or prevention focus, to actively participate and be recognized in such tasks, they would approach other processes with confidence and understanding, ultimately enhancing overall creative process engagement.

In conclusion, this study uniquely explicates the zoom-in models of relationship between individual traits and each step of the creative process which have got lumped together and interpreted as one factor in previous studies. Those models can provide an understanding of individuals' inherent engagement with each task, serving as a premise for designing universal creativity education that can potentially yield training effects for everyone.

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