

From creativity to innovation

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From creativity to innovation: Understanding and improving the evaluation and selection of ideas in educational settings

By Kim van Broekhoven

Summary

The aim of the thesis was to gain a deeper understanding of and improve the process of creative idea evaluation and idea selection among students. The 4 P's were used as theoretical framework, because students' ability to *recognize* and *select* creative ideas (i.e. product) depends strongly on attitudes, dispositions, feelings, and beliefs (i.e. person), cognitive thinking processes (i.e. process), and is subject to situational constraints (i.e. press).

Chapter 2 contributes to the long-standing discussion whether creativity is domain-general or domain-specific. For this purpose, we examined creativity differences between (a) General Thematic Areas (Art and Science); (b) Specific *Science* domains (STEM), and; (c) Engineering micro-domains, for a total of 2277 German students. To this end, a series of one-way between groups multivariate analyses of covariance (MANCOVA) and a series of one-way analyses of covariance (ANCOVA) were conducted. The results showed many statistically significant, but uniformly small, differences at all levels, across a range of person, process and product variables. The pattern of results suggest that openness, creative self-efficacy and divergent thinking may be general pre-requisites for creativity. In contrast, the way that characteristics of creative products (i.e. originality, feasibility, effectiveness) are perceived seem to be more context dependent. These insights add to the hybrid approach literature that argues that creativity has both specific and general components (Baer & Kaufman, 2005; Kaufman & Baer, 2005; Plucker, Beghetto, & Dow, 2004).

Chapter 3 investigates whether students' creativity can be developed via a 10-hour cognitive-based training programme that included idea generation and idea evaluation techniques (e.g. analogical thinking and strengths and weakness analysis). A pre-post-test within-subject design was conducted among 51 Dutch undergraduate students. The students attended the training in the first or second educational semester, and, therefore participated in both experimental conditions (control and intervention), albeit at different times (i.e. within subject design). General Linear Model (GLM) for repeated measures suggested that students generated more ideas (i.e. *fluency*) and different kind of ideas (i.e. *flexibility*) after training, but the results were non-significant. In line with prior research, the findings indicated that a cognitive-based training does not impact idea evaluation skills. This could stem from the fact that cognitive techniques - such as idea evaluation metric and strengths and weakness analysis – do not require domain knowledge, while idea evaluation is dependent on knowledge to assess novelty and feasibility of ideas and products (Crompton, 2006). As such, this chapter illustrates the importance of domain knowledge in the evaluation of ideas and adds to the emerging literature on the use and benefits of idea evaluation techniques (Vernon, Hocking, & Tyler, 2016).

Chapter 4 investigates the effect of *task exposure* or *familiarity* on idea evaluation. Specifically, we investigated whether students become better able to recognize creative ideas from others, when they themselves earlier generated ideas for the same problem (as this provides them with more insight into the associative history of each ideas, and what ideas were rejected in favour of those that were kept). For this purpose, 1864 German students evaluated ideas on their creativity, originality and feasibility. Their ratings were compared to content experts' and creativity experts' ratings. The students were randomly assigned to one of the following conditions: *task exposure* (i.e. in this condition they had to generate and evaluate ideas for the same

task) or *no task exposure* (i.e. in this condition they had to generate ideas for a different task than the idea evaluation task). The results showed that task exposure improves students' ability to accurately recognize creative and original ideas, and their ability to discriminate between highly feasible and unfeasible ideas. As such, these findings suggest that task exposure is beneficial for creative idea forecasting. Together, the results highlight the importance to carefully reconsider whether or not people should be exposed to the task before evaluating other's ideas.

Chapter 5 investigates the effect of expected implementation of ideas on children's selection of novel and feasible ideas. Children are often asked in constructivist pedagogies to transform their ideas into tangible and physical products (Beghetto & Kaufman, 2010; Cardarello, 2014; Davies et al., 2013). However, little is known whether the expectation of having to implement an idea in practice affects the kind of ideas children select. For this purpose, 403 Dutch grade-6 children (age 10-13) selected two innovative ideas to improve the use of a stuffed toy elephant with or without the expectation to actually implement these ideas in the classroom. The results showed that children who expected implementation were less likely to select original ideas, but more likely to select feasible ideas than children who had no expectation to implement ideas. Moreover, implementation focused more on feasibility as compared to originality when selecting innovative ideas. The personality trait conscientiousness was found to moderate this relationship. Children with a high conscientiousness were found to select more feasible ideas even though they were instructed to select innovative ideas and did not expect idea implementation. These findings shed light on literature that implicitly assumed that idea implementation affects idea selection (Baer, 2012; Sharma, 1999). For instance, Sharma (1999) noted that many creative ideas are generated, but few reach the implementation phase.

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