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Workshop design for enhancing the appropriateness of idea generation using analogical thinking

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ABSTRACT

As technologies advance and replace human labor in a variety of settings, we focus our attention on human creativity for generating new ideas. Business organizations, more than ever, recognize that they need employees who think creatively to maintain their competitive edge. Nonetheless, there is a lack of research assessing new ideas and influential factors in generating innovative ideas. The aim of this study is to identify the factors that influence the creation of innovative ideas. We conducted two different types of workshops with 22 subjects and 23 subjects each. In the first workshop, subjects were asked to generate new business ideas through analogical thinking. As a result, half of the participants generated appropriate ideas, and three influential factors were determined: categorization skill, deliberation, and trial and error. The second workshop was designed to facilitate participants to enhance these three factors. As a result, 70% of the participants could generate appropriate ideas. By identifying influential factors, this paper suggests a procedure for designing an innovation workshop that enables the creation of appropriate ideas.

1. Introduction

Recent cutting-edge technologies have changed our attitudes and behaviors toward our jobs and daily lives. Moving into the new era, researchers have extensively studied how humans acquire knowledge and generate new ideas (Finke, 1989; Medin, 1989; Sawyer, 2011). Further, many academic institutions deliver innovation workshops to help create new ideas. The dictionary definition of creation is "the act of making or producing something that did not exist before." However, if new ideas were produced from nothing, it would be impossible to explain the cognitive process of idea generation. Creating a new idea, no matter how surprisingly novel it is, should not be regarded as something magical or the result of divine inspiration (Sternberg, 1988).

Despite the huge amount of interest surrounding the generation of new ideas, there are few studies that focus on defining the appropriateness of new ideas and the factors that enhance the appropriateness of new ideas. In this paper, we first seek to review several studies that highlight the role of analogical thinking in generating ideas and then define appropriateness in the context of newly generated ideas. Then, we describe four cognitive procedures in idea generation through analogical thinking—acquiring knowledge, conceptualization, creative leap, and trial and error. Finally, we empirically investigate factors influencing the generation of appropriate ideas by conducting two types of workshops.

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2. Appropriateness of new ideas generated through analogical thinking

Analogical thinking is the cognitive process of transferring information or meaning from the source to the target (Gentner & Markman, 1997; Glynn, Britton, Semrud-Clikeman, & Muth, 1989; Holyoak & Lu, 2010). This section describes the role of analogical thinking in idea generation and the appropriateness of generated ideas.

2.1. Role of analogical thinking in idea generation

Metaphors are often invoked while explaining analogical thinking. Both analogies and metaphors express comparisons and highlight similarities; however, they do this in different ways (Duit, 1991). An analogy explicitly compares the structures of two domains; it indicates the identity of structural components. A metaphor compares implicitly, highlighting features or relational qualities that do not coincide in two domains. However, the carrying over of merely surface features, without a structural similarity to underpin them, may lead to a false analogy, and consequently, to a wrong solution to a problem (Goldschmidt, 1995, pp. 53–74). Holyoak et al. (2010) defined analogical thinking as focusing on abstract relational categories. The power of analogical thinking helps import structure from a well-articulated domain into a less coherent domain, revealing their common structures (Gentner et al., 1997).

There is a lack of empirical studies that examine how and to what extent analogical thinking influences creative thought. However, according to several existing studies on methods for generating new ideas, analogical thinking has the greatest theoretical support as a key driver for stimulating innovative ideas. As a consequence, researchers across major disciplines accept the premise of previous studies (Clement, 1981; Goel, 1997; Hofstadter, 2008; Holyoak and Thagard, 1996) that analogical thinking plays a central role in innovation and creativity.

2.2. Appropriateness of generated ideas

Despite tremendous efforts, researchers have been dissatisfied with the definitions of terms regarding the evaluation of new ideas, such as originality, creativity, innovativeness, or effectiveness. The complexity of “ideas” has long been acknowledged; indeed, it is one of the most difficult psychological constructs to define and measure (Hocevar, 1981). Innovation certainly requires some level of originality, but not the maximum level of novelty. Rather, a maximum level of originality can be regarded as mental illness (Runco, 2014). Appropriate new ideas are required to be useful and novel in some respect (Bruner, 1979). In extant empirical research, usefulness or some other quality of ideas, has been posited as an indicator of appropriateness (Harrington, Block, & Block, 1983; Milgram, Milgram, Gaby, & Rabkin, 1978; Mobley, Doares, & Mumford, 1992; O'Quin & Besemer, 1989; Yamamoto, 1965).

In this paper, we focus on the appropriateness of ideas generated through analogical thinking. In generating ideas through analogical thinking, the quality of ideas is conceived and operationalized in terms of two distinct dimensions: superficial and structural similarities (Blanchette & Dunbar, 2000; Dunbar & Blanchette, 2001). If ideas are created based on a structural similarity with source ideas, this increases the likelihood of benefitting from effective source mechanisms. However, this approach does not guarantee the appropriateness of generated ideas. It is necessary to maintain a structural similarity whilst achieving only superficial differences with respect to existing sources. Therefore, in this study, a new idea that has high structural similarity and low superficial similarity with existing cases is defined as an appropriate idea (Kim & Horii, 2015, 2016).

2.3. Cognitive procedures in idea generation through analogical thinking

There are a number of process models that describe the creative procedures involved in idea generation (Bransford & Stein, 1984; Burnard et al., 2006; Gordon, 1961; Isaken, Dorval, & Treffinger, 2000; Kelley, 2001; Scott, Leritz, & Mumford, 2004; Sternberg, 2006, pp. 79–104). The procedures in these models comprise two to eight steps. The simplest model is described in terms of divergent and convergent thinking. Going further, the integrated model includes problem identification, knowledge acquisition, information gathering, incubation, idea generation, combination, evaluation, and externalization. This study focuses on how people can be facilitated to create appropriate ideas. In this regard, we selected the following four key stages as instructions for the purpose of designing a workshop: acquiring knowledge, conceptualization, incubation and creative leap, and trial and error.

2.3.1. Acquiring knowledge

Boden (2004) outlined that creativity can occur in three ways: combination, exploration, and transformation. Among these three types, the majority of human creativity can be explained by combinations. Perkins (1981) asserted that creative insights occur from analogies by recognizing similarities or retrieving something we are aware of.

Although creativity researchers accepted the importance of acquiring knowledge as the preparation stage, internalizing substantial knowledge does not always result in creative ideas (Sawyer, 2003). There is controversy concerning the level of knowledge required to create new ideas in a certain domain. Gardner (2011) conducted an extensive case study on seven exceptional creators and found that ten years of study in a domain is a prerequisite to make a creative contribution. However, some researchers claim that the quantity of acquired knowledge is not correlated with creative performance (Nijstad, Stroebe,