

# Development of a mobile app for generating creative ideas based on exploring designers' on-line resource searching and retrieval behavior



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*This study explored the keyword thinking and searching habits of 24 design students and, on the basis of the research outcomes, developed an app for generating creative ideas (AGCI). Thirty practicing designers tested the app, and the retrospective interview results and feedback were used as criteria for modifying the app. This study assigned seven codes to behaviors observed in video recordings of each designer's ideation, and investigated the connections between the seven types of behaviors and the modes of associating words and images to be used as design concepts in developing the AGCI interface prototype. In addition, lateral thinking mode was found related to the designers' idea writing behavior, which could assist them in developing idea sketches further.*

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Internet development has resulted in rapidly growing usage rates for tablet PCs and smartphones and has altered communication and thought forms. Because people can communicate with each other by texting on the Internet, they may have developed a different thinking mode. Specifically, the thought process for understanding cognitive schema in language may include a process of read and understanding text messages. Therefore, text plays a vital role in this mode of communicating and thinking, which occurs in interpersonal communication and self-reflection. For example, online keyword searches are performed daily for finding relevant resources or approximate answers. People are stimulated continually by text as they engage in self-dialogue to determine the next keyword. This change in thinking mode occurs not only in daily life but also in designers' ideation. Lang, Dickinson, and Buchal (2001) determined that designers tend to spend considerable time searching for information to resolve design problems. In a study on design behavior, Yen and Cheng (2008) interviewed practicing designers and discovered that they were accustomed to using keywords to search for online resources related to design tasks. The behavior of considering and entering keywords corresponds with the assertion by Segers (2004) that text

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subtly enters ideation early in the design process, enabling memories to emerge and providing visual clues for verbally expressed associations. Text also functions to separate and unify ideas and provides semantic associations that can stimulate designers. As [Jonson \(2005\)](#) asserted, compared with hand-drawn sketches, verbal expression is a major conceptualization instrument at the initial design stages.

Ideation is the process of generating, developing, and communicating abstract, ambiguous, and imprecise ideas; it is indispensable during the design process ([Goel, 1995](#)). Words, images, and other symbols are critical triggers that can stimulate thought and association during the design process. In the past, designers depended on written information during ideation. Currently, because of the accessibility of online resource retrieval, designers exhibit the habit of using keywords in searching for resources. Therefore, emphasizing the value of text in the transformation of thinking modes is necessary in research on design cognition.

Numerous scholars in the field of design cognition have investigated the procedures for design reasoning by analyzing the sketching and verbal behaviors of designers according to sketch content development and verbal expression, thus determining the thought patterns of designers during ideation ([Goldschmidt, 1991](#); [Schön & Wiggins, 1992](#); [Suwa & Tversky, 1997, 2001](#); [Tang, 2003](#)). [Schön and Wiggins \(1992\)](#) proposed the seeing—moving—seeing model, which explains the repetitive pattern of designers' reception and reaction to visual stimuli during the design process. [Schön \(1983\)](#) contended that designers continually engage in reflection-in-action; in particular, they reflect on their idea sketches, thus facilitating design activities and idea formation. 'Seeing' is a vital impetus for design activities because it triggers reflection. Thus, researchers have typically used idea sketches to explore the creative thinking processes of designers.

The development of the Internet has enabled people to search for knowledge or resources online. The mode of searching and retrieving online resources has altered the reference behaviors of designers, meaning that they are becoming accustomed to referring to and being inspired by online resources. Previous studies have determined that designers' approaches to referencing resources may influence their thinking patterns and idea development ([Cheng, 2010](#); [Cheng & Yen, 2008](#)). Moreover, [Frey \(n.d.\)](#) suggested that mobile brainstorming apps enable people to use a recording function to capture unexpected ideas that surface in their free time for creative problem solving. In particular, the light weight of mobile devices increases the likelihood that people want to carry these devices for supporting the creative process. However, design-related studies have rarely addressed topics that are essential to researching and developing design-thinking assistance systems; such topics include whether the mode of online resource referencing exhibits diversified design thinking patterns, exerts various effects on forming design ideas, or becomes a crucial medium for researching design cognition.

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