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SearchIdea: An Idea Generation Tool to Support Creativity in Academic Search

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ABSTRACT

Users searching for information in academic contexts often need to compare different perspectives, organize search results, and synthesize topics. To support people's creative thinking processes while searching for academic information, we developed SearchIdea, a Web-based online tool, that enables users to actively interact with search results beyond evaluation and selection. Through its three primary features—search-results, SearchMapper, and IdeaMapper—SearchIdea allows users to add saved search results to SearchMapper for comparison, prioritization, and rearrangement. Using IdeaMapper, users can elicit keywords from search results, brainstorm, and organize ideas while identifying relationships among ideas. We also developed a baseline tool, IdeaPad, which provides users with a simple pad for writing and editing text. We then conducted an evaluation study with 58 students at a university in the United States. The study subjects were assigned to either SearchIdea or IdeaPad and performed two search tasks: (1) generating as many ideas as possible, and (2) selecting the best idea after generating multiple ideas. The results showed that subjects using SearchIdea entered more unique search terms, generated longer queries, and engaged with search results more actively than those who used IdeaPad. The SearchIdea users reported higher ratings for idea generation in terms of synthesizing and organizing ideas than did the IdeaPad users. The findings of our study provide insights into how an idea generation tool can connect search activities with creative thinking processes in order to generate more and better ideas.

CCS CONCEPTS

• Information systems → Users and interactive retrieval; • Human-centered computing → Interactive systems and tools.

KEYWORDS

Creativity Support Tools, Creativity, Searching for Idea Generation

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1 INTRODUCTION

Searching for information is fundamental to the process of creativity [34], and academic resources play a key role in the completion of academic creative work [21, 43]. However, searching for information for academic purposes is challenging as it requires tasks such as comprehending long documents, analyzing key points, and synthesizing complex concepts [13]. Furthermore, searching for information to generate ideas involves user goals and intents such as learning the topic space [44], finding multiple perspectives on the topic [13], and seeking inspiration and examples of ideas [76]. During the search process, users may need to track the ideas they have found and to organize those ideas to stimulate their creative thinking processes [13]. Thus, supporting idea generation during academic search tasks maximizes the value of the information-seeking process towards creativity.

Our work focuses on the cognitive dimension of creativity – the generation of ideas – in the academic search process. Creativity, which refers to the tendency to generate novel and useful ideas or products [56], is a multifaceted and complex concept. For example, creativity has been proposed to occur in a spectrum, such as the categorization of creativity into four levels in the “Four C” model of creativity [30] (i.e., *mini-c* associated with learning, *little-c* occurring in completing everyday life activities, *Pro-c* in professional life tasks and *Big-C* for eminent creativity). We conceptualize creativity as the generation of novel and meaningful ideas by ordinary people in everyday life activities—everyday creativity [51].

Current search engines work effectively for search tasks that seek to find factual information and remember knowledge. However, search engines seem to provide limited support for idea generation [41, 52]. Previous studies have demonstrated how to support creativity during the search process, such as by supplying diverse perspectives in news articles [39], stimulating presentation of search results [31], and suggesting query terms [45]. What distinguishes this study from previous studies on creativity is its focus on supporting idea generation during searches for academic tasks. More specifically, we incorporated interactive visual features in the search interface to support ideation and tracking of search results in order to support users' idea generation during academic search tasks.

Our study investigates how we can support idea generation during the search process by providing an interactive visual tool that facilitates prioritizing search results, directly eliciting keywords and ideas, and organizing ideas. Findings from previous studies support the use of visual tools in learning [20, 26, 69]. For example,