Contemporary Educational Psychology 38 (2013) 180–195

Contents lists available at SciVerse ScienceDirect

Contemporary Educational Psychology

journal homepage: www.elsevier.com/locate/cedpsych

Promoting secondary school students' evaluation of source features of multiple documents

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ARTICLE INFO

Article history:
Available online 4 April 2013

Keywords:
Source evaluation
Multiple-documents reading
Contrasting-cases intervention

ABSTRACT

The current research examined whether instructional activities centering on contrasting cases promoted secondary school students' evaluations of source features present in a multiple-documents inquiry context. Two hypothetical students' document evaluation strategy protocols were designed: One featured more sophisticated strategies commonly enacted by experts and better college students and a second featured less sophisticated strategies commonly enacted by secondary school students. A series of classroom-based activities required that students compare/contrast the two protocols to decide which were the best strategies when analyzing multiple scientific documents and why. The findings demonstrated that students who previously participated in the intervention activities included more scientific concepts from more useful documents when generating essay responses from memory, displayed better rankings of the usefulness of the set of multiple documents, and offered more principled justifications based on source feature evaluations of trustworthiness compared to students who instead received typical classroom instruction. We discuss the instructional implications of a contrasting-cases approach in facilitating secondary school students' usage of source features within multiple-documents inquiry contexts.

1. Introduction

In daily life, secondary school students access a wide variety of information sources including curricular materials, Internet articles and blogs, magazines, and television programs. Given such diverse information sources, successful comprehension requires that they are able to locate, evaluate, and integrate high quality information (Britt & Gabrys, 2002; Bråten, Britt, Strømsø, & Rouet, 2011; Goldman, 2011; Rouet, 2006). Many researchers have highlighted that trustworthiness distinctions based on available source characteristics are particularly important for efficient and effective inquiry in multiple-documents contexts (Bråten, Strømsø, & Britt, 2009; Bråten, Strømsø, & Salmerón, 2011; Goldman, 2011; Goldman, Braasch, Wiley, Graesser, & Brodowinska, 2012; Rouet, 2006; Wiley et al., 2009). If secondary students are unable to critically evaluate source characteristics of documents – especially for those retrieved from the Internet – potential detriments to comprehension and learning include information overload and an inappropriate usage of questionable sources (Graesser et al., 2007; Stadtler & Bromme, 2008). To promote secondary school students' use of source evaluation strategies in multiple-documents inquiry contexts, we designed and tested an intervention that focused on strategies we believe are central to multiple-documents comprehension—evaluations of the trustworthiness of documents' source characteristics.

1.1. Empirical evidence that source feature evaluation supports multiple-documents comprehension and learning

Prior research has established linkages between college students' discrimination of document reliability based on source attributes (e.g., author, venue, date and type of publication) and their resultant comprehension and learning from heterogeneous document sets (Anmarkrud, Bråten, & Strømsø, in press; Bråten et al., 2009; Goldman et al., 2012; Rouet, Britt, Mason, & Perfetti, 1996; Strømsø, Bråten, & Britt, 2010; Wiley et al., 2009). For example, Bråten et al. (2009) demonstrated a relationship between undergraduates' judgments of the trustworthiness of documents based on their respective source features (e.g., the type of document) and their comprehension of the information contained within the documents, both of which were assessed after reading when students did not have access to the documents. In that work, the better students were at evaluating the trustworthiness of multiple documents, the more likely they were to display accurate, coherent understandings of the textual content. Likewise, Goldman, Wiley and colleagues (Goldman et al., 2012; Wiley et al., 2009) demonstrated that college students that better differentiated the reliability of documents during reading (e.g., spent relatively more time

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http://dx.doi.org/10.1016/j.cedpsych.2013.03.003

reading and re-reading reliable information compared to poorer learners) and based their evaluations on source features associated with the documents were also those who included more accurate concepts in essays written from memory. Additional case studies of verbal protocols collected during reading suggested that better learners tended to make more principled, evaluative statements based on source features of documents during comprehension. By contrast, poorer learners were relatively inattentive to source information, spent a longer time reading information from unreliable documents, and developed less accurate understandings as a result. Thus, the research suggests that to successfully construct complete, accurate mental representations of multiple documents that one can apply to novel situations (e.g., when writing an explanation from memory), students must apply more sophisticated source evaluation strategies in efforts to selectively process higher quality information.

Nevertheless, many studies show that secondary students do not attend to source features in order to evaluate for reliability when they are attempting to comprehend multiple documents (Brem, Russell, & Weems, 2001; Britt & Aglinskas, 2002; Kiili, Laurinen, & Marttunen, 2008; Maggioni & Fox, 2009; Nokes, Dole, & Hacker, 2007; Stahl, Hynd, Britton, McNish, & Bosquet, 1996; Walraven, Brand-Gruwel, & Boshuizen, 2009; Wineburg, 1991). Research suggests that such lack of source feature consideration to establish reliability has consequences for efficiency and effectiveness when acquiring new knowledge from multiple documents. For example, in Kiili et al. (2008), secondary school students' evaluations of information resources more often concerned content relevance than credibility, with very few reflecting credibility assessments based on the available source feature information. For those characterized as "uncritical readers," a lack of attention to source feature credibility during reading coincided with a greater proportion of time spent reading information from less reliable documents. This lack of attention to source information mirrors effects reported by Wineburg (1991) and Maggioni and Fox (2009) in terms of the scant verbal protocol evidence that secondary school students use source features when they are reading to comprehend multiple history documents. When analyzing notes produced when secondary school students read multiple history documents, Britt and Aglinskas (2002) and Stahl et al. (1996) both demonstrated rare mentions of source information in student-generated notes and poor performance on source knowledge questions after reading. Moreover, poor source evaluation has been related to consideration of fictional information retrieved from novels and movies as facts to support students' arguments (Britt & Aglinskas, 2002; Seixas, 1994).

In summary, above and beyond assessing the relevance and explanation quality of the content information, source feature evaluation seems tantamount when reading to comprehend multiple diverse documents. At the same time, secondary school students appear to require promotion of source feature evaluation strategies. The research suggests a lack of consideration of the importance of the available source features leads students to spend more time processing unreliable information, and to incorporate this potentially incorrect information into their mental representations, presumably at the expense of accurate concepts from reliable sources. Thus, the primary focus of the this study was to test the efficacy of a set of instructional activities designed to promote secondary school students' acquisition and implementation of source evaluation strategies within multiple-documents inquiry contexts.

1.2. Source evaluation interventions with secondary school and college students

Several researchers have developed interventions to improve secondary or college students' consideration of source features during multiple-documents comprehension (Britt & Aglinskas, 2002; Graesser et al., 2007; Nokes et al., 2007; Reisman, 2012; Sanchez, Wiley, & Goldman, 2006; Walraven, Brand-Gruwel, & Boshuizen, 2013; Wiley et al., 2009). For example, Britt and Aglinskas (2002) developed a computer-based tutorial to promote secondary school students' attention to source features of historical documents. Inquirers were first provided with direct instruction on three strategies (sourcing, contextualization, and corroboration). During reading, note cards appeared at the bottom of each screen, which required that students provide entries about source features of documents (author, type, and date of publication), as well as about content information (Britt & Aglinskas, 2002; Britt, Perfetti, Van Dyke, & Gabrys, 2000). Results indicated that students who received the intervention cited more sources in their notes, answered more source knowledge questions correctly on a post-reading transfer test, and cited more sources in their post-reading essays relative to control students.

In an example from the domain of science, Wiley et al. (2009) instituted the *SEEK* intervention, which focused on ways to instruct college students on four important facets of documents: the *S*ource of the information in each document, the nature of the *E*vidence that was provided in each document, the fit of a document's evidence into the *E*xplanation of the phenomenon, and the fit of the new information within a document with prior *K*nowledge. The intervention students were first provided with declarative information and received instruction regarding ways to evaluate multiple documents with respect to the four components of SEEK. They then read multiple documents that varied in reliability and answered questions indicative of the criteria in the declarative information. After reading, they rank-ordered the documents based on their interpretations of the documents' reliability, justified their rank-orders, and compared their rankings with those generated by experts using the same document set. During an application task using a novel set of multiple documents, SEEK students were better at discriminating the reliability of the documents, included more correct and less incorrect causes in post-reading essays, and displayed better pre-post learning gains relative to controls.

Thus, a few interventions have been designed to improve secondary school students' consideration of source features of multiple history documents (Britt & Aglinskas, 2002; Nokes et al., 2007; Walraven et al., 2013), and to improve college students' consideration of the source features of multiple science documents (e.g., Wiley et al., 2009). However, to date, no interventions have been designed to promote secondary school students' implementation of source evaluation strategies in multiple science documents inquiry contexts. In this study we developed and implemented an intervention harnessing activities that typify science classrooms. We also extended prior work by acknowledging and targeting inappropriate evaluation strategies that secondary school students frequently employ when they interact with multiple scientific documents, building on a contrasting-cases approach recently substantiated in other instructional areas.

1.3. Instructional practices centering on contrasting cases: Evidence from various domains

The past decade has seen a growing interest in the incorporation of contrasting cases into classroom-based instructional practices for the purposes of promoting conceptual or procedural knowledge (Baker, Corbett, & Koedinger, 2004; Beitzel & Derry, 2009; Derry, Wilsman, & Hackbarth, 2007; Gadgil, Nokes-Malach, & Chi, 2012; Kurtz, Miao, & Gentner, 2001; Rittle-Johnson & Star, 2007, 2009). Seminal work by Schwartz and Bransford (1998) theorized that classroom-based activities centering on contrasting cases can improve domain learning because the comparison/contrast process affords opportunities for learners to develop a more