The Effects of Topic Familiarity, Author Expertise, and Content Relevance on Norwegian Students' Document Selection: A Mixed Methods Study

Matthew T. McCrudden
Victoria University of Wellington

Tonje Stenseth, Ivar Bråten, and Helge I. Strømsø
University of Oslo

This mixed methods study investigated the extent to which author expertise and content relevance were salient to secondary Norwegian students ($N = 153$) when they selected documents that pertained to more familiar and less familiar topics. Quantitative results indicated that author expertise was more salient for the less familiar topic (nuclear power) than for the more familiar topic (climate change), whereas content relevance was equally salient between the topics. Qualitative findings revealed 3 themes to explain this difference: (a) participants perceived that scientists had a greater ability to make correct scientific assertions than journalists; (b) when an assertion was more familiar, participants perceived less need to rely on author expertise; and (c) when an assertion was less familiar, participants perceived more need to rely on author expertise. The data sets were complementary and indicated that topic familiarity affected the salience of author expertise but not content relevance. Theoretical and practical implications of the results are discussed.

Keywords: multiple documents, author expertise, source credibility, content relevance, sequential explanatory mixed methods design

How people select and use information sources to learn about and evaluate social-scientific issues is an important topic with respect to public understanding of science in general (Britt, Richter, & Rouet, 2014; Bromme & Goldman, 2014), and specifically in relation to inquiry-based educational practices, such as task-oriented multiple document comprehension (Braasch, Bråten, Strømsø, Anmarkrud, & Ferguson, 2013; Goldman, 2004; Greene, Yu, & Copeland, 2014; Strømsø, Bråten, Britt, & Ferguson, 2013). Task-oriented reading with multiple documents involves selecting, evaluating, and using two or more documents to complete an assigned task or a self-selected reading goal (Anmarkrud, McCrudden, Bråten, & Strømsø, 2013; Bråten & Strømsø, 2010; Cerdán, Marín, & Candel, 2013; Gil, Bråten, Vidal-Abarca, & Strømsø, 2010; Vidal-Abarca, Mañá, & Gil, 2010; Wineburg, 1991). For instance, suppose a teacher asks his or her students to prepare a presentation about whether humans affect the climate, and asks them to use a variety of documents to develop the content for their presentations. To complete this task, students will need to identify, evaluate, and integrate relevant content within and across the documents, which may contain unique, corroborating, and conflicting information (Britt, Perfetti, Sandak, & Rouet, 1999; Cerdán & Vidal-Abarca, 2008; Rouet, 2006; Rouet & Britt, 2011; Wiley et al., 2009). In situations such as this, it is important that

individuals select documents that will be useful for developing a well-informed and justified position. Thus, it is important that students select relevant content from different sources.

Decisions about a document's usefulness involve judgments about the relevance of a document's content, but also judgments about a document's author (Goldman, Braasch, Wiley, Graesser, & Brodowinska, 2012; Mason, Ariasi, & Boldrin, 2011; Mason, Junyent, & Tornatora, 2014; Rouet & Britt, 2011). For instance, a student may perceive a document's content as highly relevant, but believe the author lacks expertise. Conversely, a student may believe an author has high expertise, but believe the content lacks relevance. Therefore, content relevance and author expertise may both uniquely contribute to a reader's judgments about whether a document is useful for a given task, and ultimately whether the student selects and uses the document. The purpose of the present study was to investigate the extent to which author expertise and content relevance are salient to students when they select documents for a class presentation that pertains to more familiar and less familiar social-scientific topics. To evaluate and isolate the extent to which students consider author expertise and content relevance independently in multiple document contexts, we created documents that differed with respect to content relevance and the author's content area expertise (i.e., university professors and journalists).

Content Relevance

With respect to task-oriented reading, content relevance is the perceived instrumental value of text information in relation to an individual's goal or purpose (Lehman & Schraw, 2002; McCrudden, Magliano, & Schraw, 2010; McCrudden & Schraw, 2007). Relevance differs from importance, which generally refers to the extent to which content is essential for understanding a text's main

ideas (Cirilo & Foss, 1980; Schraw, Wade, & Kardash, 1993). Content that is more instrumental to a goal is perceived as more relevant, whereas content that is less instrumental is perceived as less relevant (McCrudden, Magliano, & Schraw, 2011). For instance, if a student is preparing for a presentation on whether humans affect the climate, information about the greenhouse effect may be more relevant than information about the formation of coal. Conversely, if a student is preparing for a presentation on the origins of fossil fuels, the reverse may be true: Information about the formation of coal may be more relevant than information about the greenhouse effect. Previous research has shown that individuals direct more attention toward, and have better memory for, information that is more relevant to a task (Anmarkrud et al., 2013; Kaakinen & Hyönä, 2011; McCrudden et al., 2010; McCrudden & Schraw, 2007; Rapp & Mensink, 2011; Roelle, Lehmkuhl, Beyer, & Berthold, 2014). Thus, content relevance is related to a document's perceived usefulness.

Author Expertise

Author credibility may also affect a document's perceived usefulness. In multiple document contexts, an author is an individual who writes a message that is communicated in a document, such as a web page, journal article, or textbook. Author credibility includes two key elements: expertise and trustworthiness (Pornpitakpan, 2004). *Author expertise* refers to a reader's perception about the author's ability to make correct assertions (Pornpitakpan, 2004). For instance, on the topic of climate change, individuals may perceive a science professor as having more expertise about the topic than a journalist. That is, individuals may perceive a science professor as being more capable of making correct assertions about climate change than a journalist because of differences in their content-area expertise. *Author trustworthiness* refers to the extent to which an individual perceives that an author considers the information that he or she communicates in a document to be valid (Pornpitakpan, 2004). For instance, an individual may perceive an expert to be more trustworthy if the expert has no vested interest (e.g., financial payoff) in making an assertion (e.g., a government-supported researcher who asserts that a drug is safe) than if the expert has a vested interest in making an assertion (e.g., a government-supported researcher who asserts that a drug is safe and who owns stock in the company that provides the drug). In the present study, we focused on author expertise.

The importance of author expertise is reflected in the *documents model* (Britt et al., 1999; Britt, Rouet, & Braasch, 2013; Perfetti, Rouet, & Britt, 1999; Rouet, 2006), which is an extension of the *construction-integration (CI) model* (Kintsch, 1998). The CI model describes how a reader constructs a mental representation of a single document derived from one source, whereas the documents model describes how readers integrate information from multiple documents distributed across several sources. According to the documents model framework, a reader's mental representation may include information about the sources as well as the contents of the different documents. Characteristics of an author, such as level of knowledge (e.g., formal training in science) or credentials (e.g., scientist, journalist), can influence readers' perceptions of the credibility and usefulness of a document (Britt et al., 2014). Therefore, author expertise can affect readers' decisions about whether to select a document above and beyond its content

relevance. For instance, if given the choice between two documents with highly relevant content, a reader may be more inclined to select the document whose author has more expertise compared with the document whose author has less expertise.

Previous Research

Research indicates that source evaluation is related to a reader's mental representation of text in a multiple document context (Anmarkrud, Bråten, & Strømsø, 2014; Bråten, Strømsø, & Britt, 2009; Wiley et al., 2009). For example, Bråten, Strømsø, et al. (2009) investigated whether undergraduates' judgments of source trustworthiness would predict their comprehension of multiple documents. Students read several documents on the topic of climate change that varied with respect to source trustworthiness (e.g., a government agency with track-record of impartial policies; an oil company) and contained partly conflicting information (e.g., two documents presented different views on the causes of climate change). Their task was to prepare a brief report for other students on possible causes and effects of climate change on life on Earth. After they read, students completed three comprehension tasks. Judgments of source trustworthiness predicted comprehension; that is, students who placed more trust in documents from reliable sources also had better understanding of the issue, which suggested that they selected and processed these documents to a greater extent than documents from less trustworthy sources.

Similarly, Wiley et al. (2009) investigated the role of source reliability on undergraduates' use of multiple Internet documents for a science inquiry task. Students were asked to explain what caused a specific volcano to erupt and had access to more reliable and less reliable documents. The more reliable documents were from more trustworthy organizations and provided accurate, corroborating evidence, whereas the less reliable documents were from less trustworthy sources that did not provide accurate or corroborating evidence. Source evaluation predicted students' learning outcomes. That is, more successful students were better able to identify more reliable information, which in turn was related to their understanding of the scientific causal explanation, as measured by the number of correct and incorrect causes in their essays. Further, with respect to navigation behaviors, the amount of time spent on documents from more reliable sources was related to essay performance. Therefore, readers who selected and processed documents from more reliable sources had better performance on the learning outcomes (see also, Goldman et al., 2012, for corroborating evidence).

Although previous research indicates that students' ability to distinguish between documents from more credible and less credible sources is related to learning and comprehension, less is known about why students select different documents. Thus, we focused on the extent to which author expertise and content relevance are salient to students when they select documents for an academic task.

Theoretical Framework

The Multiple-Document Task-based Relevance Assessment and Content Extraction (MD-TRACE) model describes the processes that are involved in the use of multiple documents to complete a particular task (Rouet & Britt, 2011), such as to develop a presen-

tation or write an essay. According to this model, document use is an iterative cycle that includes five core processing steps: (a) task model construction, in which a reader interprets task instructions and generates goals for completing the task; (b) assessment of information needs, such as when a student recognizes that he or she lacks topic familiarity and will need to seek information from outside sources; (c) selection, processing, and integration of document information, such as when a student choses several documents, reads and evaluates the content, and aims to identify similarities and differences between ideas stated in each document; (d) task product construction, which is the outcome of the task, such as a presentation or an essay; and (e) assessment of product quality, which involves an evaluation of the product's quality and whether further effort must be devoted to the product.

In the present study, the process that we were most interested in was the third step: document selection. One criterion that readers use to determine the extent to which a document contributes to their goals, and ultimately is selected for use, is document reliability. This involves an evaluation of a document's source characteristics, such as author expertise. Specifically, we sought to investigate the extent to which students evaluate author expertise when they select documents whose content is more relevant or less relevant to an academic task for more familiar and less familiar topics.

Of note is that the MD-TRACE model bears resemblance to more general models of self-regulated learning, such as Zimmerman's (2000, 2011) cyclical model, in which a forethought phase involving task analysis (i.e., goal setting and planning) is followed by a performance phase involving strategic task processing, and a self-reflection phase involving evaluation of learning performance and outcomes. Moreover, current theory and research in personal epistemology, concerning people's beliefs about knowledge and knowing (Hofer & Bendixen, 2012), also highlight the importance of attending to author expertise or authority when working with multiple documents (Bråten, Britt, Strømsø, & Rouet, 2011; Chinn, Buckland, & Samarapungavan, 2011).

Next, we further elaborate upon the first two steps of the MD-TRACE model (task model construction and assessment of information needs) and their potential impact on document selection. In the first step, task model construction, a reader develops purposes and goals for the reading activity. Examples include reading to prepare for a class presentation, write an essay, or to prepare for a test. Purposes and goals affect subsequent processes involved in the search for and use of information. For instance, students use different strategies when they read for study (e.g., prepare for a test) than when they read for entertainment (van den Broek, Lorch, Linderholm, & Gustafson, 2001). The result of the first step is a task model that includes purposes and goals, procedures for reaching those goals, and criteria that help readers determine content relevance. In the second step, assessment of information needs, readers determine the extent to which they need to rely on internal (e.g., prior knowledge) and external resources (e.g., source and content of documents) to meet their goals for reading. The result of the second step is that readers determine the extent to which they are familiar with the topic and will rely on external resources to complete the task.

Thus, task model construction and assessment of information needs affect the third step, document selection, in four main, interrelated ways. First, they affect why individuals read, or the purpose for reading (Alexander & Jetton, 1996; Jetton & Alexander, 1997; Ramsay & Sperling, 2011). Second, they affect what individuals read, or their criteria for distinguishing between more relevant and less relevant information (Lehman & Schraw, 2002; McCrudden et al., 2010, 2011). Third, they affect how students read, or the strategies they use while they read (Bråten & Samuelstuen, 2004; Cerdán & Vidal-Abarca, 2008; et al., 2010; Linderholm, Kwon, & Wang, 2011; Linderholm & van den Broek, 2002; Lorch, Lorch, & Klusewitz, 1993; Magliano, Trabasso, & Graesser, 1999; Narvaez, van den Broek, & Ruiz, 1999; Roelle et al., 2014; van den Broek et al., 2001). Lastly, they affect an individual's perceived need for information from various sources and documents.

Theoretical and Practical Importance

Understanding the degree to which students evaluate author expertise and content relevance when they select documents for more familiar and less familiar topics is important for both theoretical and practical reasons. From a theoretical perspective, it is important to better understand the extent to which author expertise and content relevance have independent and potentially additive effects on students' selection of documents for an academic task. Although previous research has indicated that various source attributes (e.g., author, venue, date, type of publication) are related to document selection (e.g., Bråten, Strømsø, & Salmerón, 2011), memory for document information (e.g., Bråten, Strømsø, et al., 2009), and understanding (e.g., Anmarkrud et al., 2014; Bråten, Strømsø, et al., 2009; Goldman et al., 2012; Wiley et al., 2009; Strømsø, Bråten, & Britt, 2010), less is known about the extent to which individuals rely on author expertise and content relevance independently or jointly. Recent research has shown that individuals who are not members of a given profession may rely on their own ability to evaluate scientific information, and discount expert knowledge (Scharrer, Bromme, Britt, & Stadtler, 2012). This suggests that individuals may sometimes place less emphasis or value on author expertise when they evaluate scientific information, and instead focus on the content, in particular when this information is perceived as more comprehensible or familiar. Further, individuals may bypass (e.g., Gerjets, Kammerer, & Werner, 2011; Strømsø et al., 2013), fail to remember (e.g., Britt & Aglinskas, 2002; Stadtler & Bromme, 2008), or even ignore source information (Stadtler, Scharrer, Rouet, & Bromme, 2013). Thus, it is important to understand the extent to which author expertise and content relevance are salient to individuals when they select information.

From a practical perspective, it is important to understand how individuals' assessment of their information needs affect document selection, including a focus on topic familiarity, author expertise, and content relevance. These variables can affect different types of decisions, ranging from personal decisions with (e.g., whether to obtain vaccinations) and without (e.g., what sports drink to purchase) long-term consequences, to societal decisions such as whether to support a particular environmental policy. For instance, some individuals may choose not to obtain important vaccinations because they have accepted arguments against these vaccinations from sources that lack expertise. Similarly, despite ubiquitous acceptance of anthropogenic climate change by all major scientific bodies in the United States whose members have expertise on the topic (Oreskes, 2004), approximately 50% of Americans do not

believe that climate change is affected by human activities (Pew Research Center, 2015), which suggests that many Americans are potentially relying on information from sources who lack such expertise. Thus, it is important to better understand what document features are salient to students, and why, so that it is possible to develop effective interventions that help students select and evaluate information from multiple documents (e.g., Braasch et al., 2013; Mason et al., 2014; Sparks & Rapp, 2011; Wiley et al., 2009) that enable them to develop informed views.

Overview of the Present Study

The purpose of this mixed methods study was to investigate the extent to which author expertise and content relevance are salient to students when they select documents that pertain to more familiar and less familiar topics. We used a sequential explanatory mixed methods design, which enabled us to examine both quantitative and qualitative aspects of participants' document selection. We selected this type of design because it is ideally suited for providing insights into quantitative findings (Creswell & Plano Clark, 2011). This two-phase design began with the collection and analysis of *quantitative* data (i.e., card selection), followed by the subsequent collection and analysis of *qualitative* data (i.e., interviews). In the quantitative phase, we asked high school students to read a set of cards referring to documents that varied with respect to author expertise (higher expertise and lower expertise) and content relevance (more relevant and less relevant), and to select as many documents as they wanted in order to prepare a presentation. They did this task for two different topics (i.e., climate change and nuclear power). The purpose of the *qualitative* phase was to help explain the initial results from the *quantitative* phase. In the qualitative phase, we conducted individual interviews to further investigate participants' selection criteria between the two topics.

Quantitative Phase

The purpose of the quantitative phase was to investigate the effect of author expertise and content relevance on document selection for more familiar and less familiar topics. More specifically, we investigated the extent to which high school students evaluated author expertise and content relevance when asked to select documents for an academic task about a more familiar topic (climate change) and a less familiar topic (nuclear power). We asked participants to read a set of 20 cards that varied with respect to author expertise (i.e., higher expertise and lower expertise) and content relevance (i.e., more relevant and less relevant) for a more familiar topic (i.e., climate change). Each card included author information and a summary of the web page's content. The participants were asked to select as many cards as they wanted in order to prepare for a presentation about climate change. Then they did the same task for another set of 20 cards for a less familiar topic (i.e., nuclear power).

We conceptualized topic familiarity as a combination of topic knowledge and topic interest, a view that is consistent with Guthrie and Wigfield's (2000) engagement perspective of reading development. This view suggests that engaged reading includes both cognitive and motivational characteristics of the reader. As such, we measured topic knowledge to represent a cognitive characteristic of the readers and topic interest to represent a motivational

characteristic of the readers. Topic knowledge is the extent to which an individual has developed conceptual knowledge on a topic (Alexander, Kulikowich, & Schulze, 1994). The more topic knowledge a person has, the better equipped he or she is to engage deeply with the topic. Topic interest is the willful engagement with a topic, which plays a role in determining what people choose to learn (Schraw & Lehman, 2001). Thus, topic knowledge and topic interest were used to indicate the extent to which individuals were familiar with each of the topics from both a cognitive and motivational perspective. Further, we conceptualized familiarity as centered at the level of the individual reader (rather than the societal level), a point we return to in the Discussion section.

Hypotheses

Our quantitative research question was as follows: To what extent does topic familiarity affect the degree to which individuals take into consideration author expertise when students select more relevant and less relevant documents? We framed our inquiry in terms of three partially competing hypotheses. All three hypotheses made identical predictions with respect to the selection of cards with more relevance or less relevance: all three hypotheses predicted that individuals would select a greater number of more relevant cards than less relevant cards. Previous research has shown that task instructions increase attention to and memory for task-relevant information (Anmarkrud et al., 2013; Kaakinen & Hyönä, 2011; McCrudden & Schraw, 2007; Rapp & Mensink, 2011; Roelle et al., 2014). As such, we expected to replicate previous findings. However, the hypotheses differed with respect to participants' selection of higher expertise and lower expertise cards.

The *author salience hypothesis* states that individuals distinguish between authors with higher expertise and lower expertise and place greater value on authors with higher expertise, independent of topic familiarity. According to this view, the degree to which individuals value authors with higher expertise does not differ across topics because these authors are viewed as more qualified to make correct assertions. Previous research has shown that source credibility is related to attention and learning, such that individuals tend to direct more attention toward higher credibility sources and include more information from higher credibility sources in written products (Anmarkrud et al., 2014; Bråten, Strømsø, et al., 2009; Goldman et al., 2012; Wiley et al., 2009). This hypothesis would be supported by two additional outcomes: (a) participants should select more cards from higher expertise authors than from lower expertise authors, and (b) the degree to which individuals take author expertise into consideration should not differ between more familiar and less familiar topics. Together, these results would indicate that individuals place greater value on higher expertise authors, and the degree to which individuals value high-expertise authors does not differ between topics.

The *author nonsalience hypothesis* states that individuals do not distinguish between authors with higher expertise and lower expertise, independent of topic familiarity. According to this view, the degree to which individuals value author expertise does not differ across topics because they rely on their own ability to evaluate the veracity of the content. Previous research has shown that message features, such as comprehensibility, can increase individuals' reliance on their own evaluation of scientific infor-

mation and decrease individuals' reliance on source expertise (Scharrer et al., 2012; Scharrer, Stadtler, & Bromme, 2014). This hypothesis would be supported by two additional outcomes: (a) there should be no difference between participants' selection of cards from authors with higher expertise and lower expertise, and (b) the degree to which individuals take author expertise into consideration should not differ between more familiar and less familiar topics. Together, these results would indicate that individuals do not distinguish between authors with higher expertise and lower expertise, and the degree to which individuals value author expertise does not differ between topics.

A third possibility, the *bounded author salience hypothesis*, states that topic familiarity affects the degree to which individuals value author expertise. According to this view, when a topic is *more* familiar they place less value on author expertise, but when a topic is *less* familiar, they place greater value on the author's level of expertise. Reliance on author expertise may be a function of topic familiarity because a more familiar topic may increase the perceived comprehensibility and decrease the perceived complexity of the issue, which, in turn, may make individuals rely more on their own judgment (Scharrer et al., 2012, 2014). Nonetheless, they still take author expertise into consideration, but less so when the topic is familiar. This hypothesis would be supported by two additional outcomes: (a) participants should select more cards from higher expertise authors than from lower expertise authors, and (b) participants should place greater value on author expertise for the less familiar topic. Together, these results would indicate that topic familiarity affects the degree to which individuals take author expertise into consideration.

Method

Participants. Participants were 153 students (59.5% female) from six classes at a large public upper secondary school in southeast Norway, with an overall mean age of 17.4 years (SD = .61). Compulsory primary and secondary schooling in Norway lasts for 10 years and children start school the year they turn 6. Upper secondary education comprises all courses leading to qualifications above the lower secondary level and below the level of higher education, and it lasts for 3 years. All participants were completing college preparatory courses, with 49% attending the second and 51% attending the third year. The majority of the participants (82.4%) were native-born Norwegians who learned Norwegian as their first language, and the rest were bilingual, raised in Norway. As such, all materials were in Norwegian. The sample was relatively homogenous (i.e., middle class) in regard to socioeconomic status. Participation in the study was voluntary, and all data were treated confidentially.

Design and conditions. The quantitative phase used a 2 (topic familiarity: more familiar or less familiar) × 2 (author expertise: higher expertise or lower expertise) × 2 (content relevance: more relevant or less relevant) within-subject experimental design in which each participant was presented with two sets of cards, 20 for the more familiar topic of climate change and 20 for the less familiar topic of nuclear power, and asked to select from each set the cards they considered most useful in preparing a class presentation on the issue. Cards contained author and content information that made them vary with respect to content relevance in terms of their semantic relationships with the topics,

and with respect to author expertise in terms of the credentials and affiliations of the authors. Thus, each participant was presented with four different conditions (i.e., more-relevant/higher-expertise, more-relevant/lower-expertise, less-relevant/higher-expertise, and less-relevant/lower-expertise) for each topic.

Materials.

Topic interest measures. To measure participants' personal interest and engagement in issues and activities concerning *climate change*, we used a 12-item measure previously used and validated by Bråten, Strømsø, and colleagues (Bråten, Gil, Strømsø, & Vidal-Abarca, 2009; Strømsø et al., 2010), in which participants indicate their level of interest or engagement by rating each item on a 10-point Likert-type scale ranging from 1 (*not at all true of me*) to 10 (*very true of me*). Half of the items allowed participants to express their interest in the topic without obligation, that is, without reporting any active engagement or involvement in addressing the problem of climate change (sample item: "I am interested in international climate issues"). The other half of the items focused more on participants' active engagement and involvement in the issue, thus reflecting their willingness to act for the benefit of the Earth's climate (sample item: "I try to convince others that we should reduce the discharge of greenhouse gases"). Participants' scores on the 12-item topic interest measure concerning climate change yielded an internal consistency reliability (Cronbach's alpha) of .94. For scores on the items targeting interest without obligation, the internal consistency reliability was .88; for scores on the items focusing on engagement and involvement with the topic, it was 82.

For the purpose of the current study, we developed a parallel 12-item measure using an identical 10-point Likert-type rating scale for the topic of nuclear power. Thus, whereas half of the items just asked participants to rate their interest in energy issues and, particularly, in issues concerning nuclear power (sample item: "I am interested in issues concerning the safety of nuclear power plants"), the other half focused more on their active engagement and involvement in the issue (sample item: "I can imagine being a member of an organization working with issues concerning the use of nuclear power"). The internal consistency reliability (Cronbach's alpha) for the scores on the 12-item topic interest measure concerning nuclear power was .89. For scores on the items focusing on interest without obligation, the internal consistency reliability was .89; for scores on the items concerning engagement and involvement with the topic, it was .76.

Topic knowledge measures. As a means of assessing participants' prior knowledge about the topic of climate change, we used a 15-item multiple-choice measure that has been used and validated in prior work (e.g., Bråten, Strømsø, et al., 2009, 2011; Strømsø et al., 2010). This measure contains items referring to concepts and information central to the issue of climate change, for example, global warming, the greenhouse effect, climate gases, and the Kyoto Protocol. Taken together, the 15 items assess both conceptual understanding and factual information with respect to climate change. Of note is also that diverse aspects of the topic were covered by the prior knowledge measure, with items referring to both scientific (e.g., the greenhouse effect) and political (e.g., the Kyoto Protocol) aspects of the topic. Participants' topic knowledge scores were the number of correct responses out of the 15 items, and the scores yielded an internal consistency reliability

(Cronbach's alpha) of .64. Test–retest reliability of scores on this topic knowledge measure was computed in an independent sample of first-year education undergraduates ($n = 56$), with 2 weeks between the test and the retest. This yielded a reliability estimate (Pearson's r) of .77.

We developed a parallel 15-item multiple-choice topic knowledge measure concerning nuclear power for the purpose of this study. In designing this measure, three of the authors read extensively on the topic in textbooks and reference works, as well as on the Internet, to ensure that the concepts and information included in the measure were central to the issue of nuclear power and together wrote items to cover the concepts and information agreed upon by all three test constructors (e.g., nuclear fission, nuclear power plants, radioactive waste, and the International Atomic Energy Agency). Again, the 15 items assessed both conceptual understanding and factual information and covered scientific (e.g., nuclear fission) as well as political (e.g., the International Atomic Energy Agency) aspects of the topic of nuclear power. Participants' topic knowledge scores were the number of correct responses out of the 15 items, and their scores on this measure yielded an internal consistency reliability (Cronbach's alpha) of .67. Test–retest reliability of scores on the nuclear power topic knowledge measure was computed in an independent sample of third-year upper-secondary students ($n = 82$), with 2 weeks between the test and the retest. This yielded a reliability estimate (Pearson's r) of .724.

Please note that because the internal consistency reliabilities for the topic knowledge measures were somewhat lower than desirable, and because such estimates are less appropriate when diverse knowledge aspects are included, we also collected test–retest data to demonstrate the stability of scores on both measures. The test–retest reliabilities reported here indicate acceptable reliability values for scores on both measures (Kerlinger & Lee, 2000).

Card selection materials. For each of the topics (i.e., climate change and nuclear power), we designed a set of 20 A3 (5.8×8.3 in.) cards, with each card containing the name of an author, the author's credentials, and his or her affiliation at the top. To create variation with respect to author expertise, half of the authors in each set were professors affiliated with faculties of natural sciences at five different well-known Norwegian public universities (two from each university), and the other half were journalists from the news departments of five different well-known Norwegian radio and TV companies (two from each company; the names of all authors were made up, but the names of all universities and radio and TV companies were real). Below the author information, each card also contained three sentences of content information that varied with respect to its relevance for the task. Half of the cards in each set contained information that was more relevant, including neutral, factual information as well as information about the topics that is controversially discussed (e.g., regarding the issues of safe storage of CO_2 and radioactive waste, respectively). The more relevant content was based on information retrieved from encyclopedias, newspapers, popular science journals, and various research and information units. However, none of those sources were included on the cards, in which only the higher expertise and lower expertise authors (i.e., the university professors of natural science and the radio and TV journalists) were given. The other half of the cards in each set that were intended to be less relevant to the task contained content that was related to the

topic in question through "surface relevance cues" (Rouet, Ros, Goumi, Macedo-Rouet, & Dinet, 2011), meaning that they included keywords that were also included on the more relevant cards, but without a semantic context that made the information relevant for solving the task. Specifically, each more relevant card had a less relevant counterpart with one or more common keywords signaling a surface relationship. For example, the card containing the more relevant information "Can climate change cause more hurricanes? Climate researchers are trying to answer this question. A larger number of strong and devastating hurricanes may possibly occur" had as its counterpart a card that contained the less relevant information "The term 'hurricane' stems from a South American deity: Huracan. In the Indian Ocean such winds are called cyclones. In 1979 it was decided to give hurricanes a woman's or a man's name," with the keyword "hurricane" being the surface relevance marker on the latter card.

Thus, the set of 20 cards for each topic consisted of four categories with five cards in each category: (a) more-content-relevance/higher-author-expertise, (b) more-content-relevance/lower-author-expertise, (c) less-content-relevance/higher-author-expertise, and (d) less-content-relevance/lower-author-expertise. The names of all 20 professors and all 20 journalists were among the most popular first and last Norwegian names around 1970, and in addition to name familiarity, we controlled for authors' gender when constructing the categories. The views expressed by the university professors and the radio and TV journalists toward each issue were also counterbalanced. Below the author and content information, each card also included five blank lines with the heading "Briefly justify why you would like to read this web page carefully."

Procedure. The second author and four trained research assistants administered the materials to the students in all six classes during a 75-min class period. All instructions and materials were in Norwegian. First, each participant received a folder containing a demographic information survey and the measures of topic interest and topic knowledge. After having completed the demographic survey, they completed the topic interest measure and the topic knowledge measure, in that order, for one of the topics and then for the other, with the order of the two topics counterbalanced. Second, each participant received a large envelope containing the card selection task for one of the topics and completed this before receiving a second large envelope for the other topic, with the order of the topics counterbalanced. Participants were orally instructed to raise their hand after having completed the first topic to receive the second envelope. Each large envelope contained the 20 cards for that topic and a smaller colored envelope with "Will read carefully to prepare the presentation" printed on the front. Before starting on the card selection tasks, they were told to carefully read the written instructions printed on the front of the large envelopes. The first paragraph of these written instructions (48 words for climate change; 61 words for nuclear power) varied with the topic and basically introduced the topic (e.g., "The safety of nuclear power plants is a current and widely discussed topic"), provided some factual background information (e.g., "Nuclear power plants produce energy by splitting uranium. Uranium is a radioactive element, and in addition to energy, nuclear power plants produce radioactive waste"), and described a controversy surrounding the issue (e.g., "Today, it is being discussed whether nuclear power plants are a safe method for producing energy, or

whether the risk of accidents and problems associated with radio-active waste indicate that nuclear power plants should be shut down"). The second part of the written instructions printed on the large envelopes was identical across topics and read as follows:

> Imagine that you will give a presentation to your class on this topic. We have found 20 web pages. On the 20 cards in this envelope we have given the name of the author and a summary of the content of each web page. Read the text on each card. Remember that each card refers to a web page with more information. Select the web pages you want to read carefully to prepare your presentation. State the reason on each card that you select, and put it in the colored envelope. You can select as many cards as you want.

All participants except three (who did not complete the second card selection task) completed all the materials within the allotted 75 min, with the majority using approximately 60 min. Those who finished before the class period ended were allowed to work silently on other school tasks while the others completed the materials.

Results and Discussion

We did a preliminary analysis to evaluate whether participants' familiarity differed between the two topics. We conducted two dependent-samples t tests: one on topic interest and another on topic knowledge. We computed Cohen's d using within-group statistics from the t tests for the measurement of effect size, and d qualifying values of approximately .20 as small effects, values of .50 as medium effects, and values of approximately .80 or more as large effects (see Cohen, 1988). Topic interest scores were higher for climate change ($M = 5.8$, $SD = 1.9$) than for nuclear power ($M = 4.3$, $SD = 1.7$), $t(153) = 12.6$, $p < .001$, $d = 1.02$; similarly, topic knowledge scores were higher for climate change ($M = 9.3$, $SD = 2.4$) than for nuclear power ($M = 8.7$, $SD = 2.4$), $t(153) = 3.2$, $p < .01$, $d = .26$. Combined, these data indicated that participants were more familiar with climate change than with nuclear power. These analyses indicated that it was appropriate to treat climate change as a more familiar topic, and nuclear power as a less familiar topic, in the subsequent analyses.

To test the hypotheses, we conducted a separate 2×2 within-subject repeated-measures univariate analysis of variance (ANOVA) with author expertise and content relevance as within-subject variables on card selection for each respective topic. Author expertise referred to whether the card's author had higher expertise or lower expertise. Content relevance referred to whether the card's content was more relevant or less relevant. We computed eta squared (η^2) for the measurement of effect size, and η^2 qualifying values of approximately 0.01 as small effects, values of 0.06 as medium effects, and values of approximately 0.14 or more as large effects (see Olejnik & Algina, 2000). All tests of significance were made at the $p < .01$ level of significance. The Greenhouse-Geisser method was used to adjust for minor violations in the assumption of homogeneity of variance for the within-subjects effects using the Shapiro-Wilk test of normality. Table 1 provides means and standard deviations for card selections as a function of content relevance and author expertise for each topic.

With respect to the more familiar topic (climate change), the main effect for author expertise, $F(1, 150) = 20.76$, $MSE = 1.04$, $p < .001$, was significant and had a small to medium effect size

Table 1

Card Selection Means and Standard Deviations for Each Card Category

	More familiar: Climate change		Less familiar: Nuclear power	
Author expertise	More relevant M (SD)	Less relevant M (SD)	More relevant M (SD)	Less relevant M (SD)
Higher expertise	3.5 (1.3)	0.7 (0.9)	4.2 (1.1)	0.8 (0.9)
Lower expertise	3.1 (1.5)	0.3 (0.7)	2.8 (1.5)	0.5 (0.7)

($\eta^2 = .055$). Author expertise explained 5.5% of the variance in card selection. Participants selected a greater number of cards from higher expertise authors ($M = 2.1$, $SD = 1.8$) than from lower expertise authors ($M = 1.7$, $SD = 1.8$), 95% CIs [1.98, 2.23] and [1.60, 1.84], respectively. The main effect for content relevance, $F(1, 150) = 557.83$, $MSE = 2.15$, $p < .001$, was significant and had a large effect size ($\eta^2 = .692$). Content relevance explained 69.2% of the variance in card selection. Participants selected a greater number of more relevant cards ($M = 3.3$, $SD = 1.4$) than less relevant cards ($M = 0.5$, $SD = 0.8$), 95% CIs [3.14, 3.51] and [0.40, 0.61], respectively. The interaction effect was not statistically significant ($p > .50$), as seen in Figure 1.

With respect to the less familiar topic (nuclear power), the main effect for author expertise, $F(1, 151) = 111.26$, $MSE = 0.93$, $p < .001$, was statistically significant and had a large effect size ($\eta^2 = .208$). Author expertise explained 20.8% of the variance in card selection. Participants selected a greater number of higher expertise cards ($M = 2.5$, $SD = 1.9$) than lower expertise cards ($M = 1.7$, $SD = 1.6$), 95% CIs [2.37, 2.61] and [1.53, 1.80], respectively. The main effect for content relevance, $F(1, 151) = 751.30$, $MSE = 1.59$, $p < .001$, was statistically significant and had a large effect size ($\eta^2 = .708$). Content relevance explained 70.8% of the variance in card selection. Participants selected a greater number of more relevant cards ($M = 3.5$, $SD = 1.5$) than less relevant cards ($M = 0.7$, $SD = .08$), 95% CIs [3.30, 3.66] and [0.57, 0.78], respectively. However, these main effects were qualified by a significant interaction, $F(1, 151) = 66.12$, $MSE = 0.71$, $p < .001$, as seen in Figure 2. The post hoc test using Tukey's HSD, which controlled for family-wise error at the .01 level indicated that more-relevant/higher-expertise cards ($M = 4.2$, $SD = 1.1$), 95% CI [3.99, 4.35], were the most frequently selected category, more-relevant/lower-expertise cards ($M = 2.8$, $SD = 1.5$), 95% CI [2.55, 3.03], were more common than the remaining categories, and less-relevant/higher-expertise cards ($M = 0.8$, $SD = 0.9$), 95% CI [0.66, 0.96], were more common than less-relevant/lower-expertise cards ($M = 0.5$, $SD = 0.7$), 95% CI [0.43, 0.65].

All three hypotheses predicted that participants would select a greater number of more relevant cards than less relevant cards. The results were consistent with this predicted outcome regarding content relevance. The degree to which individuals placed value on content relevance did not differ between the topics. The effect sizes for content relevance between the topics were large and nearly identical. Specifically, the effect size for the more familiar topic was $\eta^2 = .692$, and it was $\eta^2 = .708$, for the less familiar topic. However, the three hypotheses differed with respect to their predictions about participants' card selections
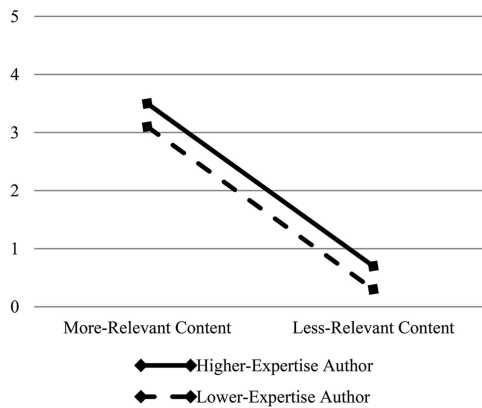
Figure 1. Mean number of cards selected that consisted of more relevant and less relevant content from authors with higher expertise or lower expertise for the more familiar topic (climate change). The interaction effect was not statistically significant.

based on author expertise for more familiar and less familiar topics. The results were consistent with the bounded author salience hypothesis, which stated that topic familiarity affects the degree to which individuals value author expertise. Consistent with its predictions, participants placed greater value on higher expertise authors for both topics. However, more importantly, the degree to which individuals placed value on author expertise differed between the topics, such that they placed much greater value on author expertise for the less familiar topic (see Figures 1 and 2). Specifically, the effect size for the less familiar topic was $\eta^2 = .208$ (large), whereas it was $\eta^2 = .055$ (small to medium) for the more familiar topic; that is, the effect size for author expertise was nearly 4 times greater for the less familiar topic. Thus, although the effect sizes for content relevance were large and nearly identical between the topics, the effect sizes for author expertise differed dramatically between the topics such that it was much larger (i.e., explained a much greater amount of variance in card selection) for the less familiar topic.

Qualitative Phase

When using a sequential explanatory mixed methods design, a researcher uses qualitative data to follow up initial quantitative findings (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 1998). In the present study, the quantitative results showed that author expertise was more salient for the less familiar topic (nuclear power) than for the more familiar topic (climate change). Previous research has examined the role of author/source expertise on document selection for a single topic; however, at least to our knowledge, no studies to date have examined the role of author expertise in document selection for more familiar and less familiar topics in the same study. Therefore, we conducted a qualitative follow-up phase to gain a more complete understanding of the value students place on author expertise for more familiar and less familiar topics.

One important element of this study was the opportunity to interview participants who had participated in the quantitative phase of the study. In particular, the qualitative phase enabled us to investigate one overarching question: Why was author expertise

more salient for the less familiar topic (nuclear power) than for the more familiar topic (climate change)? As such, we collected qualitative data in the form of interviews to address this question and to further understand the quantitative findings. This question is important because it can provide additional insights into the conditions under which source features—specifically, author expertise—are salient to students. This information can inform the development of instructional practices for situations in which students select and evaluate content from a variety of documents or sources.

Purposeful Sampling

We identified participants for whom author salience differed between the two topics. To do this, we developed a systemic three-step case selection procedure to identify potential interviewees. In the first step, we identified participants who selected a greater number of more-relevant/lower-expertise cards for the more familiar topic than for the less familiar topic. To do this, we computed the difference between the number of more-relevant/lower-expertise cards selected for the more familiar topic (climate change) and the number selected for the less familiar topic (nuclear power) for each participant. A positive value indicated that individuals selected a greater number of more-relevant/lower-expertise cards for the more familiar topic. For example, one student selected five more-relevant/lower-expertise cards for climate change and two more-relevant/lower-expertise cards for nuclear power, which resulted in a difference score of 3 (i.e., $5 - 2 = 3$).

In the second step, we identified participants who selected a greater number of more-relevant/higher-expertise cards for the less familiar topic than for the more familiar topic. To do this, we computed the difference between the number of more-relevant/higher-expertise cards selected for the less familiar topic (nuclear power) and the number selected for the more familiar topic (climate change) for each participant. A positive value indicated that individuals selected a greater number of more-relevant/higher-expertise cards for the less familiar topic. For example, one student selected five more-relevant/higher-expertise cards for nuclear power and three more-relevant/higher-expertise cards for climate
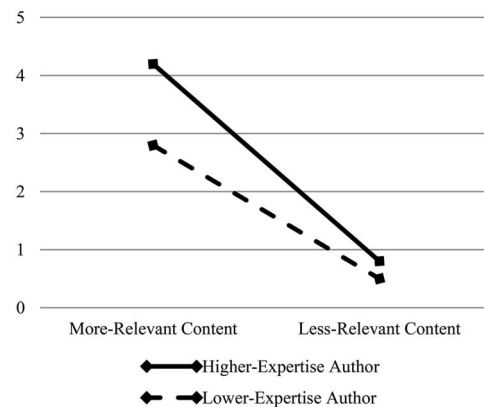

Figure 2. Mean number of cards selected that consisted of more relevant and less relevant content from authors with higher expertise or lower expertise for the less familiar topic (nuclear power). The interaction effect (ordinal) was statistically significant.

change, which resulted in a difference score of 2 (i.e., 5 − 3 = 2). Combined, these two steps enabled us to identify participants for whom author salience differed between the two topics. That is, if students selected a greater number of lower expertise cards for the more familiar topic, and a greater number of higher expertise cards for the less familiar topic, it would suggest that author salience differed between the two topics for these participants.

Thus, in the third step, we identified 38 participants who met both sampling criteria (i.e., had positive values for both difference scores). That is, these participants selected a greater number of more-relevant/lower-expertise cards for the more familiar topic (climate change), and selected a greater number of more-relevant/ higher-expertise cards for the less familiar topic (nuclear power).

We used topic knowledge and topic interest scores from these 38 participants to compare their familiarity with both topics. Tests of significance were made at the $p < .01$ level of significance. Dependent-samples t tests indicated that these participants had higher topic knowledge for climate change ($M = 9.9$, $SD = 2.2$) than for nuclear power ($M = 8.2$, $SD = 2.7$), $t(37) = 4.71$, $p < .001$, $d = .76$, and had higher topic interest for climate change ($M = 5.8$, $SD = 1.6$) than for nuclear power ($M = 4.3$, $SD = 1.6$), $t(37) = 6.03$, $p < .001$, $d = .98$. These results verified that climate change was more familiar to these participants than nuclear power.

We used card selection data from these 38 participants to compare their selections of cards based on author expertise. Tests of significance were made at the $p < .01$ level of significance. Dependent-sample t tests indicated that these participants selected a greater number of more-relevant/lower-expertise cards for the more familiar topic ($M = 3.8$, $SD = 1.0$) than for the less familiar topic ($M = 2.2$, $SD = 1.1$), $t(37) = 13.1$, $p < .001$, $d = 2.13$, and that participants selected a greater number of more-relevant/ higher-expertise cards for the less familiar topic ($M = 4.4$, $SD = 0.9$) than for the more familiar topic ($M = 2.8$, $SD = 1.1$), $t(37) = 14.25$, $p < .001$, $d = 2.31$. These results verified that author expertise was more salient for the less familiar topic than for the more familiar topic for these participants. In a sequential explanatory design, the aim is to collect enough qualitative data so that it is possible to develop meaningful themes (Creswell & Plano Clark, 2011, p.186). From this subsample of 38 purposefully selected participants, we interviewed a convenience sample (available to participate in an interview) of five participants (three female, two male) who met the aforementioned sampling criteria.

Qualitative Data Collection

Interview protocol. The interview protocol was designed to prompt participants to explain their card selections for both topics. The cards were organized by each topic. The participants reviewed which cards they had selected for climate change and explained why they had selected those cards. Then they did this for the nuclear power cards. Follow-up questions were asked when appropriate.

Procedure. We conducted individual interviews approximately three weeks after the quantitative data had been collected. During the interviews, the participants were able to view the original cards from the quantitative phase, including their handwritten justifications. The second author used the interview protocol to conduct the interviews, which were audiotaped and lasted approximately 25 min each. A professional translator translated the

interviews from Norwegian to English. The second author read through both the original interviews and the translated ones in order to detect any changed meanings or misunderstandings.

Interview Data Analysis and Results

Transcriptions of the audio-taped interviews were scored using a five-step process (Braun & Clarke, 2006; Igo, Bruning, & Riccomini, 2009; Shank, 2006). In the first step, we familiarized ourselves with the data by reading and rereading the transcripts. The first and second authors independently read the interview transcriptions to gain a holistic sense of the data and to identify any particularly interesting phrases. No sorting or coding of data occurred in this first step. Rather, this step allowed us to familiarize ourselves with the nature of the data as a whole. In the second step, we independently extracted all significant phrases from the transcripts, and then examined those statements for relevance to participants' explanations of their card selections. For example, P115 said, "The author is a professor . . . I have reason to think that [the information on the card] is correct and that this person has a lot of knowledge in this area." In the third step, we generated initial codes for the data by segmenting and labeling the extracted phrases, and identifying commonalities among the extracted phrases. For example, P115's statement was coded "knowledgeable source." In the fourth step, we developed categories from the codes by aggregating similar codes together. Sorting the subordinate codes into superordinate groups allowed for the emergence of categories. For example, the codes "knowledgeable source," "trusted source," and "credible source" were combined to create the category "reputable source." In this example, the codes and extracted phrases indicated that the participants perceived the author/ source to be qualified to make correct assertions. Thus, the term *reputable source* was used to represent this category. The other categories were "informational" (e.g., P39, "I thought that it would be good to bring some basic information about what [radioactive waste] is"), "multiple views" (e.g., P115, "This looks like this is an explanation . . . why it is kind of hazardous, so people get a slightly different perspective on things"), "interest" (e.g., P3, "I thought it would be quite interesting to include this in the presentation"), and "relevance" (e.g., P144, "It is relevant to the question since it deals with climate change"). Table 2 provides a summary of the categories, including descriptions and exemplar quotes from the interviews. The fifth step was theme identification. We compared and examined the categories to identify relevant relationships between and across the categories. Further, we compared the themes generated in the analysis and the original statements made by the interviewees. This resulted in the emergence of three themes, which we describe next.

Themes. The first theme was that participants perceived that scientists had a greater ability to make correct scientific assertions than journalists. The second theme was that when an assertion was considered to be more familiar and considered to be general knowledge, participants perceived less need to rely on author expertise. The third theme was that when an assertion was considered to be less familiar and not general knowledge, participants perceived more need to rely on author expertise. As can be seen in the interview excerpts, these themes were interrelated. For instance, P115 said,

Table 2
Qualitative Categories, Category Descriptions, and Exemplar Quotes

Categories	Category descriptions	Exemplar quotes
Informational	Students selected cards that included basic facts or ideas that would familiarize the audience with the topic.	"It is important to include concrete examples so that someone can actually relate to it." "[It's] important what climate gases actually are. Because one talks or hears a lot about it, but it is maybe helpful to know what it actually is, too, that steam is a climate gas . . . there are a lot of people who maybe aren't aware of that."
Multiple views	Students selected cards that included positive and/or negative aspects about the topic.	"This one here I thought had a little bit more of a positive angle . . . so that way, you don't just talk about all the negative consequences and accidents that I came across on one of those cards . . . there was a little bit more of a positive angle than on many of the others." "Yes, there is some skepticism regarding nuclear power plants in light of the possible dangers of these . . . like why it is kind of hazardous, so people get a slightly different perspective on things."
Reputable source	Students valued cards that had information from a source that they perceived to be reputable.	"It is a professor that has written it and that makes it more credible." "Here there is something to say about the author; a professor . . . I have reason to think that [the information on the card] is correct and that this person has a lot of knowledge in this area. And since there is a lot of discussion about nuclear energy, it is good to have this professor's viewpoint that says how it is becoming safer to use nuclear power plants."
Interest	Students selected cards that provided information that the audience would find interesting.	"Because I thought that it would be interesting to include in this presentation, like, what can happen, what kind of consequences climate change can have . . . and then there was this thing, whether it could result in hurricanes, which I thought maybe it might be exciting to talk about." "[The card] raises questions about whether climate change can result in more hurricanes; it could be interesting to include in a presentation."
Relevance	Students selected cards that had information that was relevant to the topic.	"[It is an] important problem that is relevant in terms of nuclear energy . . . that you get radioactive waste . . . you have a number of problems for a long time. So I am also thinking that has to be included when you talk about nuclear energy." "It is relevant to the question since it deals with climate change."

I feel that the climate issue is talked about a lot more than nuclear energy. And that therefore, since I do not know a whole lot about nuclear energy, I would put more stock in what a professor had to say regarding nuclear energy. And because journalists base what they write on knowledge that comes from research.

This suggests that participants found source to be more important for less familiar information. Further, this particular comment suggests that the participant recognized that science professors were in a better position to make correct scientific assertions than a journalist, given that journalists rely upon scientists as their source of information. Similarly, the following comment from P144 demonstrates the conditions under which the participant perceived source expertise to be important:

I feel that I know more about climate and there are several things on the climate cards that are obvious, and that if I sort of know it already, then the source is not so critical . . . whereas with nuclear energy, I do not know so much so then I'm maybe more interested in who says what.

It is clear from this comment that source mattered more when the topic was less familiar.

Participants also identified perceived differences in the comprehensibility and complexity of both topics. For instance, P71 said,

I think nuclear power is a bit more advanced . . . but you know quite a lot about climate change. So therefore I chose more professors on nuclear power to provide the basic information. It is more difficult to figure out on one's own and to understand.

This suggests that participants perceived nuclear power to be more difficult to understand and more complex, and sought authors with higher expertise to help them overcome these difficulties. Further, there was less perceived need to inform the audience about climate change; they assumed the audience would be familiar with the topic. Therefore, they selected lower expertise authors to a greater extent for climate change because they wanted to provide elaborative information about the topic to build upon their existing knowledge. For instance, P3 said,

I think that the scientist cards give more basic information, while the journalist cards give more examples . . . I know more about [climate change] from before because it interests me more and it's more often in the media . . . so I do not think I would have such a great need for the basic factual knowledge . . . so I would actually know more about [climate change] than about [nuclear power]. I would spice it up more with these journalist cards, with a few more examples.

These comments, and others like them, indicated that participants' card selections were based in large part on their familiarity

with the topic and that there was an inverse relationship between topic familiarity and reliance on author expertise: When a topic was less familiar, there was greater reliance on author expertise; conversely, when a topic was more familiar, there was less reliance on author expertise.

Mixing/Integration of Quantitative and Qualitative Data

Integration in mixed methods involves the explicit combination of quantitative and qualitative components of a study (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009). Integration is used to draw conclusions from both data sets (Teddlie & Tashakkori, 2009). One way to integrate both data sets is through merging, which includes the blending of quantitative and qualitative results, which we do next.

In the first phase of the study, the quantitative analysis suggested that topic familiarity affected author salience for card selections. We were interested in further explaining why author expertise was more salient for the less familiar topic (nuclear power) than for the more familiar topic (climate change). We combined the quantitative (i.e., card selection) and qualitative (i.e., interviews) data to provide a more comprehensive description of students' card selections between the two topics (see Table 3).

With respect to climate change, students indicated that they were more familiar with the topic and believed that the audience would be too. As a result, they felt that author expertise was less important in selecting cards. For instance, when P144 explained why a more-relevant/lower-expertise card was selected for climate change, the participant said,

> [The card] deals with the rainforest . . . with what can solve climate change . . . and it is from TV2. It's probably not a statement that one needs a really credible source to assess because it is something you hear about.

Thus, participants appeared to believe that the information about climate change was common knowledge, and it mattered more what the card said than who said it.

With respect to nuclear power, students indicated that they were less familiar with the topic and believed they would benefit from including more information about it, as would the audience. Further, given their lack of familiarity with the topic, they were more reliant on author expertise because they perceived university scientists to be more qualified to make accurate assertions about nuclear power than journalists. For instance, P3 said, "[Nuclear power], which I know much, much less about, I would backup my arguments more with what I trust from the professors." Thus, participants were more reluctant to select cards about a less familiar topic when the information was not from a more qualified source or conveyed information that was not perceived to be common knowledge. In sum, students' reported criteria were reflected in their card selections.

Conclusions and Discussion

We found that participants placed greater value on more relevance content and higher expertise authors for both topics. However, more importantly, the degree to which individuals placed value on author expertise differed between the topics, such that they placed much greater value on author expertise for the less familiar topic, despite the fact that they valued content relevance nearly identically between the topics. In the follow-up qualitative phase, we interviewed a group of purposefully selected students to investigate why they valued author expertise to a greater extent for the less familiar topic. Three main themes emerged. First, participants perceived that scientists had a greater ability to make correct scientific assertions than journalists. Second, when an assertion was considered to be more familiar and general knowledge, participants perceived less need to rely on author expertise. Third, when an assertion was considered to be less familiar and not general knowledge, participants perceived more need to rely on author expertise. When we mixed the quantitative and qualitative data, a more complete data set emerged. Students' reported selection criteria from the qualitative phase were reflected in their card selections choices from the quantitative phase. Thus, the quantitative and qualitative data were complementary and provided a more comprehensive understanding of participants' perceptions of author expertise and content relevance than either data set alone.

The main conclusion from the present study is that topic familiarity affected the salience of author expertise, but did not affect the salience of content relevance. One explanation for these results is that individuals used different strategies to evaluate the validity of the scientific information: first-hand evaluation and second-hand evaluation (Bromme & Goldman, 2014; Bromme, Thomm, & Wolf, 2013). The fundamental distinction between first-hand and second-hand evaluation pertains to the type of question the individual seeks to answer when evaluating the veracity of a knowledge claim. With respect to first-hand evaluation, the individual

Table 3
Integrated Results Matrix

Quantitative results	Qualitative results	Exemplar quote
When the topic was *more* familiar (climate change) and cards were more relevant, participants' placed *less* value on author expertise.	When an assertion was considered to be *more* familiar and considered to be general knowledge, participants perceived *less* need to rely on author expertise.	P144: "I feel that I know more about climate and there are several things on the climate cards that are obvious, and that if I sort of know it already, then the source is not so critical . . . whereas with nuclear energy, I don't know so much so then I'm maybe more interested in who says what."
When the topic was *less* familiar (nuclear power) and cards were more relevant, participants placed more value on authors with higher expertise.	When an assertion was considered to be *less* familiar and *not* general knowledge, participants perceived *more* need to rely on author expertise.	P3: "[Nuclear power], which I know much, much less about, I would back up my arguments more with what I trust from the professors."

seeks to answer the following question: "What is true?" Individuals may evaluate the truthfulness of a scientific claim differently, and independent of the actual truthfulness of the claim. Factors that may affect individuals' evaluations include personal experience (e.g., Rudman, McLean, & Bunzl, 2013) and comprehensibility or complexity of a claim (e.g., Scharrer et al., 2012, 2014). As indicated, it is important to note that a person's belief about what is true can be independent of what is actually true (based on the assumption that all scientific knowledge claims are tentative, yet some are supported by better evidence and arguments). Nonetheless, when people acknowledge that they lack relevant personal experience or prior knowledge, they may instead rely on second-hand evaluation. With respect to second-hand evaluation, the individual seeks to answer the following question: "Which source of knowledge is credible?" This question is answered in a much different way. The focus is less on the message and more on the messenger. Inevitably, second-hand evaluation may be used to a greater extent when individuals are unable to evaluate knowledge claims in the same way as experts or individuals with specialized knowledge. In the present study, the data suggest that topic familiarity affected the salience of author expertise. Specifically, for the more familiar topic of climate change, the students appeared to rely to a greater extent on first-hand evaluation, whereas by comparison, they appeared to rely on second-hand evaluation to a greater extent for the less familiar topic of nuclear power.

Theory

Selecting documents that contain relevant information from credible sources is related to better understanding of a topic from multiple documents (e.g., Wiley et al., 2009). According to the MD-TRACE model (Rouet & Britt, 2011), document use includes five core processing steps: (a) task model construction; (b) assessment of information needs; (c) selection, processing, and integration of document information; (4) task product construction; and (5) assessment of product quality, which involves an evaluation of the product's quality and whether further effort must be devoted to the product. We focused on the role that assessment of information needs (Step b) had on document selection (Step c). The results are consistent with the idea that students' assessment of their information needs affects document selection, including a focus on topic familiarity, author expertise, and content relevance.

This study tested two theoretical propositions. First, this study tested whether topic familiarity affects the assessment of information needs, particularly the salience of author expertise (Britt et al., 2014; Bromme & Goldman, 2014). The results were compatible with this idea. Specifically, when a topic is more familiar, individuals rely on their own ability to interpret scientific knowledge claims to a greater extent than when a topic is less familiar. Participants indicated that they were less familiar with nuclear power than with climate change, and tended to rely on author expertise to a greater extent for the less familiar topic. Comparatively speaking, participants were aware of differences in their familiarity with the two topics, and sought higher expertise authors when they perceived the topic to be less familiar. Thus, topic familiarity affects the assessment of information needs, and author expertise is one pertinent feature that affects document selection.

Second, this study tested the theoretical proposition that source features, specifically author expertise, and content relevance are independent, yet related, constructs (Rouet & Britt, 2011). The results were compatible with this idea. Specifically, content relevance was equally valued and highly salient to participants for both topics such that they clearly valued more-relevant content to a greater extent than less relevant content. This suggests that individuals were skilled at identifying task-relevant information (Anmarkrud et al., 2014). However, the fact that participants placed greater value on author expertise for the less familiar topic than for the more familiar topic indicated that participants treated content relevance and author expertise as independent constructs. This suggests that assessment of information needs differed by topic and that author expertise and content relevant provided unique contributions to students' assessment of their information needs. However, although students may be able to distinguish between author expertise and content relevance, the extent to which they take both constructs into consideration when selecting documents also seems to be context-dependent in the sense that it varies by topic.

From a methodological perspective, this study demonstrates the potential value of a mixed methods design in theoretically driven psychological research. The central premise of mixed methods research is that "the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone" (Creswell & Plano Clark, 2007, p. 5). By combining the quantitative data with the qualitative data, we provided a more comprehensive picture of how topic familiarity affects document selection. Thus, a mixed methods design enabled us to identify important differences in individuals' selection criteria that otherwise would have remained hidden.

Practice

Technology has transformed literacy and learning in the 21st century. The development of the Internet affords immediate access to massive amounts of information on virtually any topic imaginable. However, information on the same topic can differ substantially in quality. As such, individuals who use the Internet to search for information to address academic, personal, and professional questions need to be able to critically evaluate different information sources for their relevance and credibility, and they need to be able to integrate information across different sources (Goldman et al., 2012; Greene et al., 2014). Increasing students' awareness of how they evaluate the usefulness of documents within and across topics may be one way to help them strike an adaptive balance between author expertise and content relevance when they assess their information needs in the context of multiple documents. When students select and integrate information from various documents, it is crucial that they understand the reliability and validity of the information contained in those documents. This can affect the basis of their understanding of a topic (e.g., Braasch et al., 2013; Mason et al., 2014; Wiley et al., 2009) and their metacognitive judgments about whether further effort is needed to develop their understanding, and if so, what documents to access and how to evaluate them (Rouet & Britt, 2011). When students select and use documents, they need to justify their decisions; further, those decisions should be made on the basis of defensible reasons. Two criteria that can be used to justify decisions are author expertise and content relevance. When students select and use documents, they should determine which documents should be included, which

documents should be excluded, and understand why. Therefore, helping students be aware of their reasons for choices is one way to help them to critique the documents they use because it is a malleable factor related to learning.

It may be useful for educators to provide students with documents that vary along such features as familiarity, author expertise, and content relevance, and ask them to evaluate and compare their document selection criteria. Doing so may allow students to develop greater metacognitive awareness of why they select certain documents, and enable them to reflect upon and monitor whether such criteria enable them to develop well-informed and justified positions on various topics. This implication aligns with the tenets of disciplinary literacy (Shanahan & Shanahan, 2008), in which content area teachers are responsible for instructing students on the advanced, discipline-specific strategies of reading, writing, and argumentation. For instance, when content area experts read about information in their area of expertise, they consider the reliability of sources and evaluate the methods and evidence used to support arguments (e.g., Shanahan & Shanahan, 2008; Wineburg, 1991, 1998). Further, activities such as asking students to evaluate and compare their document selection criteria may provide instructors with formative assessment of students' selection criteria, which can be used to inform instructional decisions such as what to emphasize during instruction and how much time to devote to the development of critical evaluation skills (Wopereis & van Merriënboer, 2011). For instance, if students tend to disregard source information for topics that they perceive as familiar to themselves and others, teachers may need to integrate content area teaching with instruction that fosters the evaluation of document source features (Braasch et al., 2013).

Learning to critically evaluate documents is important not only for choosing and using multiple documents in school but also for everyday decision making and the participation in democratic discourse (Bråten, Strømsø, et al., 2011). Accordingly, the practical importance of this line of research reaches well beyond the classroom. For instance, individuals' ability to evaluate information from multiple sources is critical when they make personal decisions (e.g., career choices, financial investments), health-related decisions (e.g., decisions about medication and medical treatments), and public engagement in socioscientific topics (e.g., climate change).

Limitations and Future Research

There are several directions for future research. First, future research should investigate what information and sources students use when they create a product for an academic task. In the present study, participants selected cards for an academic task (i.e., class presentation) but did not use the cards to complete the task. It is possible that students' decisions about what information to use, and which sources to rely upon, may change once they read more of a document. Thus, although the purpose of this study was to investigate students' card selections and criteria for selection, a logical extension of this line of research would be to investigate what information and sources students use when they generate a product. Further, it would be interesting to investigate whether initial selection differs from subsequent use. If such differences exist, the question of why this occurs may also be addressed.

Second, future research should investigate selection criteria and use for different task instructions. In the present study, the task instructions asked students to prepare for a class presentation. Different types of task instructions may affect students' selection and use of documents. For instance, in the interviews, some of the students indicated that they included information because they thought it would be interesting to include in a presentation or because they thought that including some information would help them receive a good grade on the presentation. Thus, the task instructions (i.e., read to prepare a class presentation) may have affected participants' use of journalists as sources because of the entertainment value of their presentations. This suggests that the task instructions might have affected the motivation to use different sources such that the goals to entertain and perform differ from the goal to inform. It is possible that the particular task instructions might have led participants to develop one or all of these goals for the task, which could impact their card selections. Thus, future research should investigate selection criteria and use for different task instructions.

Third, from a methodological perspective, future research that utilizes sequential explanatory mixed methods designs should minimize the delay between task completion and retrospective reporting, and provide context cues during retrospective reporting, both of which strengthen the validity of the reports (Ericsson & Simon, 1993). Although both immediate and delayed reporting are susceptible to post hoc rationalizations, the risk is lower as the time between task completion and retrospective reporting is lower (Nisbett & Wilson, 1977). In the present study, we attempted to mitigate post hoc rationalizations by asking students to note why they selected specific documents during the document selection task and by providing these notes to students in the interviews (i.e., contextual cues). Nonetheless, it is possible that post hoc rationalizations might have affected the qualitative results, given that the interviews took place 3 weeks after the document selection task. Given the nature of a sequential explanatory design (i.e., quantitative data needs to be analyzed prior to participant selection and interviews), it is important for researchers to recognize that this design feature may affect the validity of the subsequent qualitative data when using retrospective reporting and aim to minimize the delay between task completion and retrospective reporting, as well as provide context cues.

Fourth, future research could investigate the difference between personal and societal topic familiarity. In the present study, the topic familiarity scales measured participants' topic interest and topic knowledge at the personal level, as opposed to the societal level. The quantitative analyses confirmed differences in topic familiarity between the topics, which were corroborated in the qualitative phase, in which interviewees referred to their own familiarity with the topics. Participants seemed to infer from their own level of familiarity that the topics were also more familiar or less familiar at a societal level. This is a reasonable inference given that climate change is particularly relevant for northerly regions of the world and, accordingly, a highly publicized and discussed issue in Norway. Conversely, nuclear power is less publicized or debated because Norway does not have nuclear power plants, nor is there political controversy surrounding the issue. Although conceptually distinct, these two levels of familiarity (personal and societal) may have been psychologically blurred for our participants. Thus, future research should investigate to role that personal

and societal familiarity play in document selection. For instance, when students engage in task-oriented reading for an assignment, the audience may affect which documents they chose. A discrepancy in topic familiarity between the student and audience may affect document selection. For example, students may select different documents when preparing a presentation for classmates than when writing an essay for an instructor.

Fifth, future research could investigate selection and use of documents for a range of topics that vary with respect to familiarity. The present study focused on two topics. Despite the fact that participants seemed to be more familiar with one of the topics, the less familiar topic was not completely foreign, as evidenced by the topic knowledge scores. One would expect that author expertise would be even more salient for exceptionally unfamiliar topics. Thus, future research could selection and use of documents for a range of more familiar and less familiar topics.

Lastly, author expertise was represented as either university science professors or journalists in this study. However, author expertise can differ along various dimensions within each category (e.g., a university science professor from a more reputable vs. less reputable university; a journalist from a more reputable or less reputable media outlet) and among categories (e.g., a journalist may be perceived as having more expertise than someone from another profession). Thus, future research could investigate perceived author expertise for authors along different dimensions.

In conclusion, author expertise and content relevance are independent, yet related, constructs. Further, topic familiarity can affect the salience of author expertise. When a topic is more familiar, individuals may be more likely to rely on their own ability to interpret scientific knowledge claims. On the down side, topic familiarity might create an illusion of knowing and individuals may overestimate their ability to evaluate such claims. For instance, Scharrer et al. (2012) found that when nonexperts read simplified scientific texts, they were more likely to rely on their own evaluation of scientific information and less likely to rely on expert knowledge. On the up side, in situations in which topic familiarity is higher, it may enable individuals to more effectively evaluate the veracity of scientific knowledge claims. Further, in situations in which topic familiarity is lower, it may signal to the individual a greater need to use second-hand evaluation, as appeared to be the case in the present study.

References

Alexander, P. A., & Jetton, T. L. (1996). The role of importance and interest in the processing of text. *Educational Psychology Review, 8,* 89–121. http://dx.doi.org/10.1007/BF01761832

Alexander, P. A., Kulikowich, J. M., & Schulze, S. K. (1994). How subject-matter knowledge affects recall and interest. *American Educational Research Journal, 31,* 313–337. http://dx.doi.org/10.3102/00028312031002313

Anmarkrud, Ø., Bråten, I., & Strømsø, H. I. (2014). Multiple-documents literacy: Strategic processing, source awareness, and argumentation when reading multiple conflicting documents. *Learning and Individual Differences, 30,* 64–76. http://dx.doi.org/10.1016/j.lindif.2013.01.007

Anmarkrud, Ø., McCrudden, M. T., Bråten, I., & Strømsø, H. I. (2013). Task-oriented reading of multiple documents: Online comprehension processes and offline products. *Instructional Science, 41,* 873–894. http://dx.doi.org/10.1007/s11251-013-9263-8

Braasch, J. L. G., Bråten, I., Strømsø, H. I., Anmarkrud, Ø., & Ferguson, L. E. (2013). Promoting secondary school students' evaluation of source

features of multiple documents. *Contemporary Educational Psychology, 38,* 180–195. http://dx.doi.org/10.1016/j.cedpsych.2013.03.003

Bråten, I., Britt, M. A., Strømsø, H. I., & Rouet, J. F. (2011). The role of epistemic beliefs in the comprehension of multiple expository texts: Toward an integrated model. *Educational Psychologist, 46,* 48–70. http://dx.doi.org/10.1080/00461520.2011.538647

Bråten, I., Gil, L., Strømsø, H. I., & Vidal-Abarca, E. (2009). Personal epistemology across cultures: Exploring Norwegian and Spanish university students' epistemic beliefs about climate change. *Social Psychology of Education, 12,* 529–560. http://dx.doi.org/10.1007/s11218-009-9097-z

Bråten, I., & Samuelstuen, M. S. (2004). Does the influence of reading purpose on self-reports of strategic text processing depend on students' topic knowledge? *Journal of Educational Psychology, 96,* 324–336. http://dx.doi.org/10.1037/0022-0663.96.2.324

Bråten, I., & Strømsø, H. I. (2010). When law students read multiple documents about global warming: Examining the role of topic-specific beliefs about the nature of knowledge and knowing. *Instructional Science, 38,* 635–657. http://dx.doi.org/10.1007/s11251-008-9091-4

Bråten, I., Strømsø, H. I., & Britt, M. A. (2009). Trust matters: Examining the role of source evaluation in students' construction of meaning within and across multiple texts. *Reading Research Quarterly, 44,* 6–28. http://dx.doi.org/10.1598/RRQ.44.1.1

Bråten, I., Strømsø, H. I., & Salmerón, L. (2011). Trust and mistrust when students read multiple information sources about climate change. *Learning and Instruction, 21,* 180–192. http://dx.doi.org/10.1016/j.learninstruc.2010.02.002

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3,* 77–101. http://dx.doi.org/10.1191/1478088706qp063oa

Britt, M. A., & Aglinskas, C. (2002). Improving students' ability to identify and use source information. *Cognition and Instruction, 20,* 485–522. http://dx.doi.org/10.1207/S1532690XCI2004_2

Britt, M. A., Perfetti, C. A., Sandak, R., & Rouet, J. F. (1999). Content integration and source separation in learning from multiple texts. In S. R. Goldman, A. C. Graesser, & P. van den Broek (Eds.), *Narrative, comprehension, causality, and coherence: Essays in honor of Tom Trabasso* (pp. 209–233). Mahwah, NJ: Erlbaum.

Britt, M. A., Richter, T., & Rouet, J. F. (2014). Scientific literacy: The role of goal-directed reading and evaluation in understanding scientific information. *Educational Psychologist, 49,* 104–122. http://dx.doi.org/10.1080/00461520.2014.916217

Britt, M. A., Rouet, J. F., & Braasch, J. L. G. (2013). Documents as entities: Extending the situation model theory of comprehension. In M. A. Britt, S. R. Goldman, & J. F. Rouet (Eds.), *Reading: From words to multiple texts* (pp. 160–179). New York, NY: Routledge.

Bromme, R., & Goldman, S. R. (2014). The public's bounded understanding of science. *Educational Psychologist, 49,* 59–69. http://dx.doi.org/10.1080/00461520.2014.921572

Bromme, R., Thomm, E., & Wolf, V. (2013). From understanding to deference: Laypersons' and medical students' views on conflicts within medicine. *International Journal of Science Education, Part B, Communication and Public Engagement, 5,* 68–91. http://10.1080/21548455.2013.849017

Cerdán, R., Marín, M. C., & Candel, C. (2013). The role of perspective on students' use of multiple documents to solve an open-ended task. *Psicología Educativa, 19,* 89–94. http://dx.doi.org/10.1016/S1135-755X(13)70015-0

Cerdán, R., & Vidal-Abarca, E. (2008). The effects of tasks on integrating information from multiple documents. *Journal of Educational Psychology, 100,* 209–222. http://dx.doi.org/10.1037/0022-0663.100.1.209

Chinn, C. A., Buckland, L. A., & Samarapungavan, A. (2011). Expanding the dimensions of epistemic cognition: Arguments from philosophy and

psychology. *Educational Psychologist, 46,* 141–167. http://dx.doi.org/10.1080/00461520.2011.587722

Cirilo, R. K., & Foss, D. J. (1980). Text structure and reading time for sentences. *Journal of Verbal Learning & Verbal Behavior, 19,* 96–109. http://dx.doi.org/10.1016/S0022-5371(80)90560-5

Cohen, J. (1988). *Statistical power analyses for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research.* Thousand Oaks, CA: Sage.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles, CA: Sage.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data.* Cambridge, MA: MIT Press.

Gerjets, P., Kammerer, Y., & Werner, B. (2011). Measuring spontaneous and instructed evaluation processes during web search: Integrating concurrent thinking-aloud protocols and eye-tracking data. *Learning and Instruction, 21,* 220–231. http://dx.doi.org/10.1016/j.learninstruc.2010.02.005

Gil, L., Bråten, I., Vidal-Abarca, E., & Strømsø, H. I. (2010). Summary versus argument tasks when working with multiple documents: Which is better for whom? *Contemporary Educational Psychology, 35,* 157–173. http://dx.doi.org/10.1016/j.cedpsych.2009.11.002

Goldman, S. R. (2004). Cognitive aspects of constructing meaning through and across multiple texts. In N. Shuart-Ferris & D. M. Bloome (Eds.), *Uses of intertextuality in classroom and educational research* (pp. 313–347). Greenwich, CT: Information Age.

Goldman, S. R., Braasch, J. L. G., Wiley, J., Graesser, A. C., & Brodowinska, K. M. (2012). Comprehending and learning from Internet sources: Processing patterns of better and poorer learners. *Reading Research Quarterly, 47,* 356–381.

Greene, J. A., Yu, S., & Copeland, D. Z. (2014). Measuring critical components of digital literacy and their relationships with learning. *Computers & Education, 76,* 55–69. http://dx.doi.org/10.1016/j.compedu.2014.03.008

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (3rd ed., pp. 403–422). New York, NY: Longman.

Hofer, B. K., & Bendixen, L. D. (2012). Personal epistemology: Theory, research, and future directions. In K. R. Harris, S. Graham, & T. Urdan (Eds.), *APA educational psychology handbook* (Vol. 1, pp. 227–256). Washington, DC: American Psychological Association. http://dx.doi.org/10.1037/13273-009

Igo, L. B., Bruning, R. H., & Riccomini, P. J. (2009). Should middle school students with learning problems copy and paste notes from the Internet? Mixed methods evidence of study barriers. *Research on Middle Level Education Online, 33,* 1–10.

Jetton, T. L., & Alexander, P. A. (1997). Instructional importance: What teachers value and what students learn. *Reading Research Quarterly, 32,* 290–308. http://dx.doi.org/10.1598/RRQ.32.3.4

Kaakinen, J. K., & Hyönä, J. (2011). Online processing of and memory for perspective relevant and irrelevant text information. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 223–242). Greenwich, CT: Information Age.

Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research* (4th ed.). Fort Worth, TX: Harcourt College Publishers.

Kintsch, W. (1998). *Comprehension: A paradigm for cognition.* Cambridge, UK: Cambridge University Press.

Lehman, S., & Schraw, G. (2002). Effects of coherence and relevance on shallow and deep text processing. *Journal of Educational Psychology, 94,* 738–750.

Linderholm, T., Kwon, H., & Wang, X. (2011). The effects of reading purpose on advanced readers. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 197–222). Greenwich, CT: Information Age Publishing.

Linderholm, T., & van den Broek, P. (2002). The effects of reading purpose and working memory capacity on the processing of expository text. *Journal of Educational Psychology, 94,* 778–784. http://dx.doi.org/10.1037/0022-0663.94.4.778

Lorch, R. F., Jr., Lorch, E. P., & Klusewitz, M. A. (1993). College students' conditional knowledge about reading. *Journal of Educational Psychology, 85,* 239–252. http://dx.doi.org/10.1037/0022-0663.85.2.239

Magliano, J. P., Trabasso, T., & Graesser, A. C. (1999). Strategic processes during comprehension. *Journal of Educational Psychology, 91,* 615–629. http://dx.doi.org/10.1037/0022-0663.91.4.615

Mason, L., Ariasi, N., & Boldrin, A. (2011). Epistemic beliefs in action: Spontaneous reflections about knowledge and knowing during online information searching and their influences on learning. *Learning and Instruction, 21,* 137–151. http://dx.doi.org/10.1016/j.learninstruc.2010.01.001

Mason, L., Junyent, A. A., & Tornatora, M. C. (2014). Epistemic evaluation and comprehension of web-source information on controversial science-related topics: Effects of a short-term instructional intervention. *Computers & Education, 76,* 143–157. http://dx.doi.org/10.1016/j.compedu.2014.03.016

McCrudden, M. T., Magliano, J. P., & Schraw, G. (2010). Exploring how relevance instructions affect personal reading intentions, reading goals, and text processing: A mixed methods study. *Contemporary Educational Psychology, 35,* 229–241. http://dx.doi.org/10.1016/j.cedpsych.2009.12.001

McCrudden, M. T., Magliano, J. P., & Schraw, G. (2011). Relevance in text comprehension. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 1–17). Greenwich, CT: Information Age.

McCrudden, M. T., & Schraw, G. (2007). Relevance and goal-focusing in text processing. *Educational Psychology Review, 19,* 113–139. http://dx.doi.org/10.1007/s10648-006-9010-7

Narvaez, D., van den Broek, P., & Ruiz, A. B. (1999). The influence of reading purpose on inference generation and comprehension in reading. *Journal of Educational Psychology, 91,* 488–496. http://dx.doi.org/10.1037/0022-0663.91.3.488

Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we know: Verbal reports on mental processes. *Psychological Review, 84,* 231–259. http://dx.doi.org/10.1037/0033-295X.84.3.231

Olejnik, S., & Algina, J. (2000). Measures of effect size for comparative studies: Applications, interpretations, and limitations. *Contemporary Educational Psychology, 25,* 241–286. http://dx.doi.org/10.1006/ceps.2000.1040

Oreskes, N. (2004). Beyond the ivory tower: The scientific consensus on climate change. *Science, 306,* 1686. http://dx.doi.org/10.1126/science.1103618

Perfetti, C. A., Rouet, J. F., & Britt, M. A. (1999). Towards a theory of documents representation. In H. van Oostendorp & S. R. Goldman (Eds.), *The construction of mental representations during reading* (pp. 99–122). Mahwah, NJ: Erlbaum.

Pew Research Center. (2015, January 29). *Public and scientists' views on science and society.* Retrieved from http://www.pewinternet.org/2015/01/29/public-and-scientists-views-on-science-and-society/

Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology, 34,* 243–281. http://dx.doi.org/10.1111/j.1559-1816.2004.tb02547.x

Ramsay, C. M., & Sperling, R. A. (2011). The relevance of purpose: Why

purpose situates relevance instructions. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 243–265). Greenwich, CT: Information Age Publishing.

Rapp, D. N., & Mensink, M. C. (2011). Focusing effects from online and offline reading tasks. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 141–164). Greenwich, CT: Information Age.

Roelle, J., Lehmkuhl, N., Beyer, M.-U., & Berthold, K. (2014, October 20). The role of specificity, targeted learning activities, and prior knowledge for the effects of relevance instructions. *Journal of Educational Psychology*. Advance online publication. http://dx.doi.org/10.1037/edu0000010

Rouet, J. F. (2006). *The skills of document use*. Mahwah, NJ: Erlbaum.

Rouet, J. F., & Britt, M. A. (2011). Relevance processes in multiple document comprehension. In M. T. McCrudden, J. P. Magliano, & G. Schraw (Eds.), *Text relevance and learning from text* (pp. 19–52). Greenwich, CT: Information Age.

Rouet, J. F., Ros, C., Goumi, A., Macedo-Rouet, A., & Dinet, J. (2011). The influence of surface and deep cues on primary and secondary school students' assessment of relevance in Web menus. *Learning and Instruction, 21,* 205–219. http://dx.doi.org/10.1016/j.learninstruc.2010.02.007

Rudman, L. A., McLean, M. C., & Bunzl, M. (2013). When truth is personally inconvenient, attitudes change: The impact of extreme weather on implicit support for green politicians and explicit climate-change beliefs. *Psychological Science, 24,* 2290–2296. http://dx.doi.org/10.1177/0956797613492775

Scharrer, L., Bromme, R., Britt, M. A., & Stadtler, M. (2012). The seduction of easiness: How science depictions influence laypeople's reliance on their own evaluation of scientific information. *Learning and Instruction, 22,* 231–243. http://dx.doi.org/10.1016/j.learninstruc.2011.11.004

Scharrer, L., Stadtler, M., & Bromme, R. (2014). You'd better ask an expert: Mitigating the comprehensibility effect on laypeople's decisions about science-based knowledge claims. *Applied Cognitive Psychology, 28,* 465–471. http://dx.doi.org/10.1002/acp.3018

Schraw, G., & Lehman, S. (2001). Situational interest: A review of the literature and directions for future research. *Educational Psychology Review, 13,* 23–52. http://dx.doi.org/10.1023/A:1009004801455

Schraw, G., Wade, S. E., & Kardash, C. A. (1993). Interactive effects of text-based and task-based importance on learning from text. *Journal of Educational Psychology, 85,* 652–661. http://dx.doi.org/10.1037/0022-0663.85.4.652

Shanahan, T., & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents: Rethinking content-area literacy. *Harvard Educational Review, 78,* 40–59.

Shank, G. D. (2006). *Qualitative research: A personal skills approach* (2nd ed.). Upper Saddle River, NJ: Pearson.

Sparks, J. R., & Rapp, D. N. (2011). Readers' reliance on source credibility in the service of comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 37,* 230–247. http://dx.doi.org/10.1037/a0021331

Stadtler, M., & Bromme, R. (2008). Effects of the metacognitive computer-tool *met.a.ware* on the web search of laypersons. *Computers in Human Behavior, 24,* 716–737. http://dx.doi.org/10.1016/j.chb.2007.01.023

Stadtler, M., Scharrer, L., Rouet, J. F., & Bromme, R. (2013, July). *Source information can fuel validity judgments: Empirical investigation of a short training for vocational students.* Paper presented at the Annual Meeting of the Society for Text and Discourse, Valencia, Spain.

Strømsø, H. I., Bråten, I., & Britt, M. A. (2010). Reading multiple texts about climate change: The relationship between memory for sources and text comprehension. *Learning and Instruction, 18,* 513–527.

Strømsø, H. I., Bråten, I., Britt, M. A., & Ferguson, L. E. (2013). Spontaneous sourcing among students reading multiple documents. *Cognition and Instruction, 31,* 176–203. http://dx.doi.org/10.1080/07370008.2013.769994

Tashakkori, A., & Teddlie, C. (1998). *Applied Social Research Methods Series: Vol. 46. Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks, CA: Sage.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences.* Thousand Oaks, CA: Sage.

van den Broek, P., Lorch, R. F., Jr., Linderholm, T., & Gustafson, M. (2001). The effects of readers' goals on inference generation and memory for texts. *Memory & Cognition, 29,* 1081–1087. http://dx.doi.org/10.3758/BF03206376

Vidal-Abarca, E., Mañá, A., & Gil, L. (2010). Individual differences for self-regulating task-oriented reading activities. *Journal of Educational Psychology, 102,* 817–826. http://dx.doi.org/10.1037/a0020062

Wiley, J., Goldman, S. R., Graesser, A. C., Sanchez, C. A., Ash, I. K., & Hemmerich, J. (2009). Source evaluation, comprehension, and learning in internet science inquiry tasks. *American Educational Research Journal, 46,* 1060–1106. http://dx.doi.org/10.3102/0002831209333183

Wineburg, S. (1991). Historical problem solving: A study of the cognitive processes used in the evaluation of documentary and pictorial evidence. *Journal of Educational Psychology, 83,* 73–87. http://dx.doi.org/10.1037/0022-0663.83.1.73

Wineburg, S. (1998). Reading Abraham Lincoln: An expert/expert study in the interpretation of historical texts. *Cognitive Science, 22,* 319–346. http://dx.doi.org/10.1207/s15516709cog2203_3

Wopereis, I. G. J. H., & van Merriënboer, J. J. G. (2011). Evaluating text-based information on the World Wide Web. *Learning and Instruction, 21,* 232–237. http://dx.doi.org/10.1016/j.learninstruc.2010.02.003

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). San Diego, CA: Academic Press. http://dx.doi.org/10.1016/B978-012109890-2/50031-7

Zimmerman, B. J. (2011). Motivational sources and outcomes of self-regulated learning and performance. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 49–64). New York, NY: Routledge.