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Title: Thinking about global warming: The effect of policy-related documents and prompts on learning about causes of climate change.

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Strand of work: Basic Studies

Submitted Abstract:

We examined students' understanding of the causes of a scientific phenomenon from a multiple-document-inquiry unit. Students read several documents that each described causal factors that could be integrated to address the given writing task of explaining the causes of change in average global temperature. We manipulated whether the document set included a document that took a position on climate change policies and whether a reading/writing prompt focused only on understanding the causes ("explain how and why recent temperature changes are occurring") or also included a solution-related addendum ("and what we can do about it"). The results suggest that including a policy-related document can lead to poorer learning outcomes for the causes of climate change, with evidence that students focused upon policy in lieu of, rather than in relation to, a causal understanding of the issue.

Purpose and Questions Investigated, Assessments or Tools developed

We examined the influence of a task (whether the prompt focused only on understanding the causes of a scientific phenomenon or also asked to consider solutions) and a text factor (whether or not the document set included a policy-related document) on students' learning from multiple documents about the causes of climate change.

Research Context or Methodology

Setting and Participants: Forty-six 7th graders from science classes in a public school from the northern Illinois region

Research Design, Data Collection, and Analysis: As part of their science classes, students were asked to complete a two-day document-based inquiry on "How and why are recent patterns in global temperatures different from what has been observed in the past?" In the experiment, we tested for independent contributions of the document set and writing prompt on learning. We manipulated whether or not the document set included a policy-related editorial-style document. In addition, we manipulated the prompt to focus either only on understanding the causes ("explain how and why recent temperature changes are occurring") or to also include policy ("and what we can do about it"). Students wrote the essays with the texts present and then completed a verification task from memory (i.e., rating whether statement was consistent with ideas in text).

General statement of findings

The text set had an effect on students' essays. Including an editorial document led to essays with less coverage of the important concepts, shorter causal explanations, and more policy information than those in the core-documents condition. The prompt also had an effect on students' essays. Students with an additional policy prompt performed better on verification task than those in the standard prompt condition and included a higher proportion of policy sentences than those in the standard causal prompt condition.

Implications

The results suggest that an editorial-style document discussing solutions and policies related to the topic may be harmful to learning for students writing about a causal explanation of the phenomena. These results suggest that more attention is needed in instruction to help students to be able to read and evaluate opinion-based texts like political editorials, and to distinguish between scientific information about causes and policy stances that might make use of that information. The results, however, showed a possible benefit from the policy prompt in performance on the verification test suggesting that adding the policy prompt to the causal prompt can help student comprehension. These results are encouraging because it is important to demonstrate that tasks to encourage engagement do not have negative effects on learning.

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