

Intelligent Support for Knowledge Building Across Web Spaces

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Problem

Many tools, such as Knowledge Forum (KF) and Hypothes.is, are great for facilitating student dialogues. While KF provides specialized support for knowledge-building discourse, Hypothes.is as a web annotation technology allows students to make sense of web materials collaboratively. However, these platforms operate independently and are not connected to support cohesive knowledge work by students. Often times, student work is scattered across different spaces, requiring substantial efforts from students to stay organized. Given students are working with a broad range of web information, they need more support to build knowledge effectively across web spaces.

Research and Development Goals

This work builds on the IdeaMagnets project that allows students to import their web annotations from Hypothes.is into KF to continually develop their ideas (Chen et al., 2020). Our goal is to devise intelligent support for the process of connecting web annotations with student writing in KF. We will achieve this goal by:

1. Conducting network-based text mining on students' KF and Hypothes.is contributions
2. Suggesting search terms that students can use to search their Hypothes.is annotations in order to bridge knowledge gaps in their KF discourse

Results

We analyzed data from a Grade 9 science class that used both *KF* and *Hypothes.is* to facilitate group knowledge building. To provide intelligent support for idea development, students' KF notes were imported into InfraNodus – a web-based software tool that generates insights into the text based on analysis of a cooccurrence network of terms (Paranyushkin, 2019). Structural gaps can be identified based on the analysis, suggesting terms students could use to search their Hypothes.is annotations in order to close the identified gaps. For example, as illustrated in Figure 1, the class' KF discourse currently covers two clusters of terms related to greenhouse gases but these two clusters are weakly connected. Using this insight, a student can search their Hypothes.is annotations via the IdeaMagnets tool to identify external web information that may help the class bridge the gap. The student can also use the extracted topics and terms to further develop ideas, discern idea connections, and create rise-above ideas.

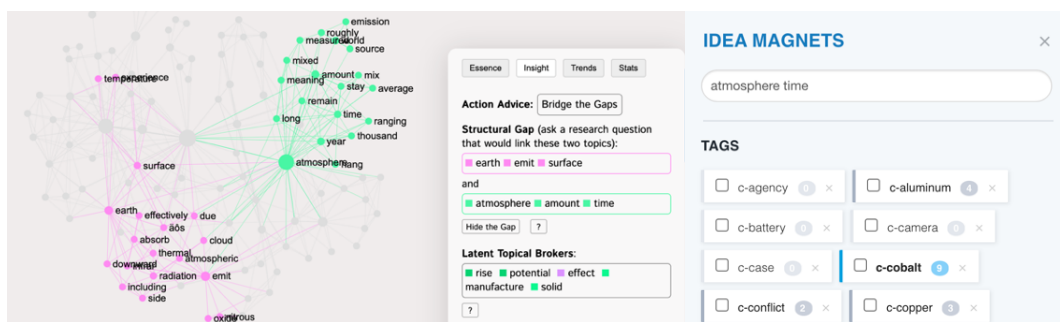


Figure 1. (a) Text analysis showing a structural gap. (b) Using search terms in IdeaMagnets to bridge the gap.

Significance & Next Steps

The present study aims to build intelligent support to harness system log data to scaffold continual development of student ideas based on rich information. Our next steps are to continue exploring features of InfraNodus, and text network analysis in general, to support students' knowledge building across web spaces. This work will inform future prototyping within the Knowledge Forum environment.

References

- Chen, B., Chang, Y.-H., & Groos, D. (2020, November). *Crisscrossing information spaces with the IdeaMagnets tool*. Paper presented at the 2020 Knowledge Building Summer Institute (KBSI), Toronto, ON, Canada.
- Paranyushkin, D. (2019). InfraNodus: Generating insight using text network analysis. *The World Wide Web Conference*, 3584–3589. <https://doi.org/10.1145/3308558.3314123>.