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Curriculum-Idea-Analytics: An Idea-Centric Approach to Curriculum

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The curriculum document remains as one of the most important resource and reference for teachers. Teachers typically follow the prescribed learning objectives in the curriculum for a particular grade level, there is no need for them to take students beyond the grade level. This approach creates a clear baseline knowledge, but it limits the opportunities for further exploration. Thus, it is not surprising that curriculum syllabus is often regarded as a constraint to student inquiry and discourse.

In Knowledge Building class, we focus on students' engagement in generative and creative exploration of ideas so that they develop and improve their ideas in ways that are meaningful to them. This exploration is supported by Knowledge Forum (Figures 1 and 2)—an electronic discussion forum for students to share and build ideas in an interactive manner.

For students to work on these ideas in a creative and productive way, they need to be supported to systematically understand the ideas, connect and synthesise relevant ideas, explore anomalies, identify knowledge gaps and promising ideas in a continuous manner. Teachers play a key role in giving support to students in developing such higher order processes to deal

Figure 1. A discourse space on Knowledge Forum, commonly known as Knowledge Forum View.
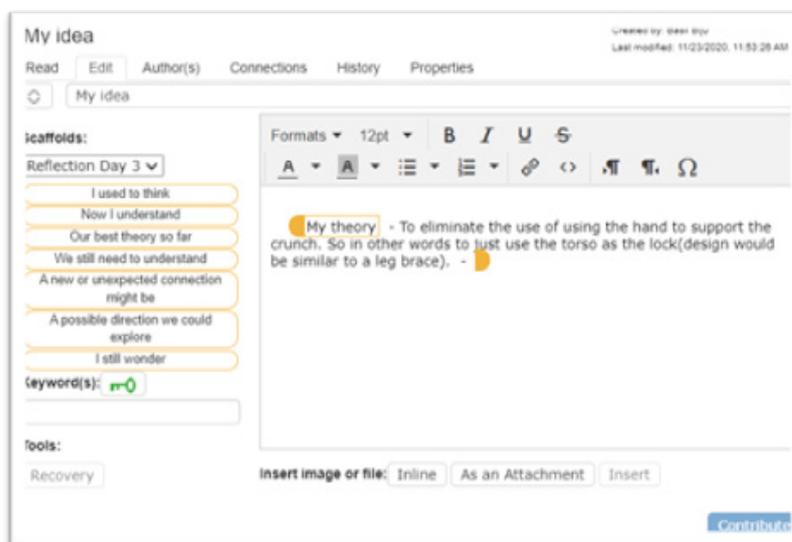

Figure 2. The features of a KF note in a KF view.

with complex problems in learning. This project proposes one of the ways in which teachers can support without taking over critical thinking and processes from students, is to use curriculum syllabus and other authoritative resources constructively to facilitate students in their idea improvement process. Curriculum-idea-Analytics (CiA) was developed for this purpose.

Curriculum-ideas-Analytics (CiA)

Big ideas refer to key scientific ideas that cut across topics and grade levels in the
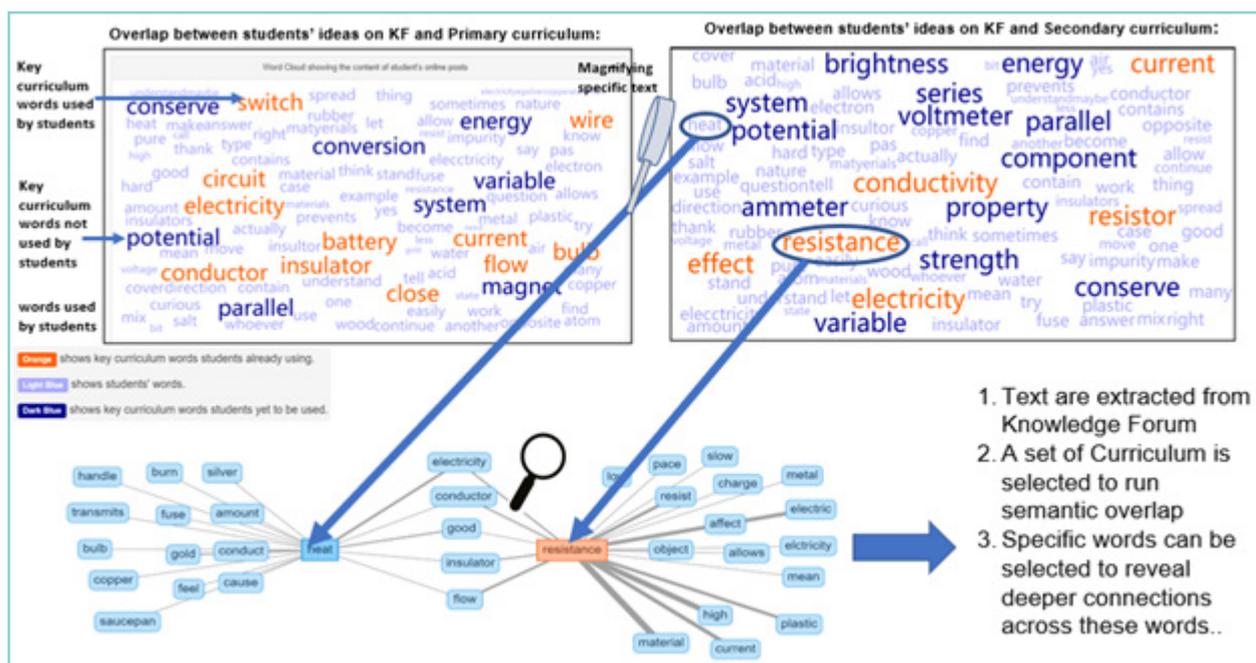
Figure 3. CiA wordclouds and network of words to support analysis of students' discourse.

curriculum. For example, in Electricity, big ideas include energy conservation, electrical system and electrical energy. These big ideas provide broader frames to connect to students' ideas and question, creating a richer and more generative classroom discussion (Ong, Teo, Tan, & Kim, 2020). This means that such framing can potentially support more powerful pedagogical direction and lesson ideas for teachers (Teo, Lee, & Ong, 2021).

The big ideas were derived from mapping and connecting factual knowledge (Specific Instructional Objectives [SIOs]) across grade levels. Using a learning analytics programmed with text mining technology, the semantic space of these big-ideas can be compared with semantic space from students' online discourse to produce a colour-coded word cloud (shown in Figure 3 above). The color codes show (i) the common "ideas" between curriculum big ideas and students' discussion (orange text); (ii) what the students are not discussing in the big idea curriculum (dark blue text); and (iii) any other ideas from students' discussion (light blue text).

These color-coded word-clouds help teachers and students visualise different possibilities of their inquiry and discussion and generate different path of inquiry as they

» explore big ideas from higher grades. For example, primary students can explore how they have been inquiring on resistance and potential difference from the Secondary curriculum;

» check the connections between their discussion and the big idea in the curriculum and explore the commonalities and differences; and

» look for promising ideas to advance inquiry by looking at the connections between words in the big idea curriculum, such as heat and resistance (Figure 3).

References

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