Knowledge Building (KB)
KB is an established learning sciences theory and approach of learning through collective idea improvement among students. It has been seen to create shifts in teachers’ and students’ epistemic stance across many research work.

Learning Analytics (LA)
LA builds teachers’ competencies in two ways: (1) it supports teachers in understanding key concepts and connections of the topics across curriculum; and (2) allows teachers to see overlaps of their students’ discourse with that of the curriculum map, thus supporting their pedagogical intervention to identify promising ideas.

Research Questions

For teachers:
1. What are teachers’ insights on the use of Learning Analytics in understanding big ideas in curriculum and students’ emerging ideas in light of the key ideas in the curriculum?

For students:
2. How has the use of Learning Analytics improved students’ reflections on their learning in terms of their conceptual understanding of the topic(s)?

Purpose of Proposal

1. To design technological innovation (Learning analytics) for teachers and students to support a robust complete and productive KB environment and experience.

2. To develop pedagogical intervention based on visualisation of visible and invisible learning pattern churned by analytics.

3. To formulate a developmental framework to analyse the quality of 21st century classroom practice.

Trajectory of KB network development:
Level 1: Collective wisdom generated from 7 core schools
Level 2: Strong implementation (deepening the practice)
Level 3: Transformative practice (sustaining the practice) through ground-up learning networks in an organic process, e.g., teachers/school leaders join on their own accord after getting to know about KB

Why this proposal? Gaps in KB practice

1. Teachers seldom involve students in the process of identification of promising ideas and definition of inquiry path:
   a. Teachers take over critical higher order thinking
   b. Students do not see the need to work on ideas

2. Teachers often steer clear of ‘interesting’ ideas from students:
   a. Students’ ownership and agency towards the inquiry is minimum.
   b. Inquiry process is steered by teacher’s idea and towards one specific path and solution instead of student-led inquiry

Background: Existing KB Network Learning & School-led Transformative Practice

KB Network Activities in 2018:
- 23-27 June: London, UK International Conference of Learning Sciences (Practitioners’ Track)
- 18 July: KB NLC
- 14-17 August: KB Summer Institute 2017 held in Toronto, Canada (Live streaming of practitioner session, Details will be announced later)
- 22 Nov: KB Symposium, Chua Chu Kang Primary School

Upcoming KB Network Activities in 2019:
Knowledge Building course for in-service teachers

To get updates on KB network activities, register your email at: https://docs.google.com/forms/d/e/1FAIpQLSe_8cmyNy2JTvyYgGDHzXN8U1B8Y_zF_e9zMs0kQIWabvCDmdg/viewform?usp=sf_link
### Indicators for students’ development of 21CC in a KB environment

<table>
<thead>
<tr>
<th>21CC: Critical and Inventive Thinking</th>
<th>Teacher’s pedagogical moves</th>
<th>Students’ KB activities</th>
<th>How learning analytics can help teachers &amp; students</th>
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<tr>
<td>Students exploring possibilities/ pathway and generating ideas in relation to real issues/challenge</td>
<td>Designing trigger, creating time and space for students to share ideas and to figure the focus of their inquiry</td>
<td>Students post ideas (questions, information, theories, explanation etc.)</td>
<td><strong>1. Scaffold trackers</strong> provide in-time feedback for teachers to understand student choices/actions and to navigate the complex idea landscape in their KB work. Students can also reflect on their own thinking in the inquiry. E.g. students immediately realized they had contributed too many theories and questions but not enough information.</td>
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<td>Students exercising sound reasoning, decision/making and metacognition</td>
<td>Provide space for students to read, understand and connect to one another’s ideas. Analyse students’ ideas in light of the concepts, big ideas and connection in curriculum.</td>
<td>Students put in effort to understand and appreciate diverse ideas. Students negotiate a fit between their own ideas and others’ ideas.</td>
<td><strong>2. Word Cloud</strong> provides a visual of the ideas emerging in class so that students can discuss on ideas that they might have missed out.</td>
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<td>Students managing complexities and ambiguity; suspend judgement, and assess conclusions and consideration</td>
<td>Provide space for students to explore promising ideas that is beyond isolated facts that they need to learn.</td>
<td>Students to see the growing knowledge in light of curriculum and scientific inquiry.</td>
<td><strong>3. Light up the curriculum!</strong> Analytic tool allows teacher and students to see the overlap between key ideas from students’ discourse on KF, key ideas from curriculum maps, and key ideas from scientific articles.</td>
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### How Learning Analytics can help teachers understand the 21CC competency

1. **Scaffold Tracker**
   
   The Scaffold Tracker tool can be used to explore/assess both the community’s as well as individual students’ scaffold use, and gives an overview of the contribution diversity in the KB discourse. This tool enables teachers to visualize students’ engagement and discourse patterns, e.g., Do students keep using the same scaffolds repeatedly? Are students using higher-level scaffolds?

2. **Word Cloud**
   
   Word Cloud is an analytic tool that supports students in understanding the keywords of a topic’s terms, and enables students to see how many of these keywords they are actually contributing in their notes.

3. **Light up the Curriculum!**
   
   This analytic tool enables teachers to find related areas to a specific topic or discipline that they are investigating with their students, and supports teachers in using these as big ideas across the curriculum.

### Participating schools:

Endeavour Primary School; St. Hilda’s Primary School; Haig Girls’ School; Teck Whye Secondary School; Ping Yi Secondary School; Ang Mo Kio Primary School; Chua Chu Kang Primary School.

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