

# Middle and Secondary School Teachers' and Students' Journey of Constructivist Knowledge Building with Knowledge Forum

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## Introduction

Knowledge is not only a support for work and production...but the key form of work and production itself, as more educated people work in the fields of ideas, communication, selling, marketing, counseling, consultancy, tourism, event organizing and so forth.

(A. Hargreaves, 2003, p. 16)

We live in a knowledge society, in which ideas and knowledge are increasingly being regarded as products in their own right, not just a means to product creation as in the past. We also live in the digital age, where computer technology continuously creeps in upon increasingly more aspects of our daily living activities.

As foundational ICT skills penetrate throughout our society, students will be expected to apply the basics in authentic, integrated ways to solve problems, complete projects, and creatively extend their abilities.

(International Society for Technology in Education, 2007)

Then there are the 21<sup>st</sup> century skills to consider. Drawing from cognitive science, as well as workplace readiness as defined by the US government, business, and industry, the Metiri Group put forth the enGauge 21<sup>st</sup> Century Skills in 2003 (<http://www.metiri.com/features.html>). These skills are categorized into 4 strands: digital-age literacies, inventive thinking, effective communication, and high productivity.

In consideration of the knowledge society, the digital age, and 21<sup>st</sup> century skills, how might educators provide engaging learning experiences that would prepare our learners to be successful in these 3 phenomena of our time? To reframe the question down to a more manageable scale, I asked myself: "How might we engage students in non-fiction writing through constructivist knowledge building and digital media creation?" This question prompted the launch of the Knowledge Building Culminating Activity (KBCA) project in late autumn 2008. The purpose of this project was to assist teachers and empower students to use Information Communication Technologies (ICT) to demonstrate their learning of

Ontario Ministry of Education curriculum expectations with an emphasis on non-fiction writing.

In my capacity as a Toronto District School Board (TDSB) ICT and e-Learning Instructional Leader at the time, I had the opportunity to work with and support K-12 teachers across the school board in the curricular integration of ICT.

Recognizing that the school library is often the hub of the school, and that the school Teacher-Librarian(s) are vital to this hub, it was quickly determined that a school's Teacher-Librarian would be this project's initial point of contact.

Teacher-Librarians often have an interest in curricular ICT integration and are likely to share their ICT integration strategies with the school staff, thereby building capacity within the school over time. Furthermore, Teacher-Librarians often have a good gauge on individual teaching styles and methodological interests of a school's teaching staff. Hence, Teacher-Librarians have the greatest potential to make a school-wide impact as effective change agents and change agent recruiters on any school teaching staff.

A proposal form was distributed to a number of TDSB Teacher-Librarians, which outlined the project's purpose and goals, the ICT Instructional Leader's role, the teachers' role, and the school administration's role. The project could be, but was not limited to, a research project whereby the 4-stage Ontario School Library Association (OSLA) inquiry and research model (Ontario School Library Association, 1998; TDSB, 2005 & 2006) would be implemented. A large part of the learning process would involve online student collaboration for constructivist knowledge building through non-fiction writing, in a digital environment called Knowledge Forum (<http://www.knowledgeforum.com>).

Assessment and evaluation were also a key consideration. Hence the Ontario Ministry of Education's Achievement Chart categories were included in the project vision. Ontario Achievement Charts identify 4 categories of knowledge and skills: (1) knowledge and understanding, (2) thinking, (3) communication,

and (4) application. This is a province-wide guide for teachers to assess and evaluate student performance on evidence collected over time (Ontario Ministry of Education, 2004).

The following table summarizes the initial vision of how OSLA’s inquiry and research model, non-fiction writing, constructivist knowledge building, ICT, and the Ontario Achievement Chart could be integrated:

<b>Inquiry &amp; Research Model</b> (Ontario School Library Association, 1998) <a href="http://www.accessola.com/action/positions/info_studies/html/research.html">http://www.accessola.com/action/positions/info_studies/html/research.html</a>	<b>Non-Fiction Writing + Constructivist Knowledge Building + ICT Integration</b>	<b>Ontario Achievement Chart Categories Addressed</b> (Ontario Ministry of Education, 2004) <a href="http://www.edu.gov.on.ca/eng/document/policy/achievement/index.html">http://www.edu.gov.on.ca/eng/document/policy/achievement/index.html</a>
Stage 1: Preparing for Research	Constructivist knowledge building in Knowledge Forum	<ul style="list-style-type: none"> <li>▪ Knowledge &amp; Understanding</li> <li>▪ Thinking</li> <li>▪ Communication</li> </ul>
Stage 2: Accessing Resources	Constructivist knowledge building in Knowledge Forum	<ul style="list-style-type: none"> <li>▪ Knowledge &amp; Understanding</li> <li>▪ Thinking</li> <li>▪ Communication</li> </ul>
Stage 3: Processing	Constructivist knowledge building in Knowledge Forum	<ul style="list-style-type: none"> <li>▪ Knowledge &amp; Understanding</li> <li>▪ Thinking</li> <li>▪ Communication</li> </ul>
Stage 4: Transferring Learning	Students create: <ul style="list-style-type: none"> <li>▪ Digital Comics (using Comic Life), OR</li> <li>▪ Podcast (using Audacity)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Communication</li> <li>▪ Application</li> </ul>

Table 1. KBCA integration model.

Limited choice was given as to the type of performance task / culminating activity to be produced by students at the end – either a digital comic or a podcast.

Project goals were:

- Students will collaborate in an online environment – Knowledge Forum - for knowledge building through non-fiction writing

- Students will demonstrate Ontario Ministry of Education curriculum expectations through a final digital comic using Comic Life, or podcast using Audacity
- Each classroom teacher will collaborate with their Teacher-Librarian and ICT Instructional Leader to create and develop a performance task / culminating activity with ICT integration throughout the delivery, process, and product that includes non-fiction writing to support literacy
- ICT Instructional Leader will assist with the implementation of a project-based learning model that will build capacity and can be shared among teachers within the school
- Students will be engaged and motivated to achieve and demonstrate their learning through essential ICT skills

Participating teachers would be provided with four supply coverage days to support planning, implementation, and presentation of project goals. In addition, these teachers and their students would be supported throughout the project by an ICT Instructional Leader through face-to-face meetings as well as online. School teams who wished to participate in the KBCA project must be comprised of a Teacher-Librarian and two classroom teachers of different grades or different subjects. Interested school teams were encouraged to submit their project proposals.

Budgetary and time resources allowed me to work with two school teams – a middle school team and a secondary school team. Both schools were culturally diverse inner-city schools. The table below summarizes the composition of each school team and the subject areas addressed by these teachers in the KBCA project.

<b>Middle School</b>	
T. Friesen	Teacher-Librarian
S. Shorey	Gr. 6 Language Arts & Social Studies
E. Galli	Gr. 8 Language Arts & History
<b>Secondary School</b>	

D. Jaksic	Teacher-Librarian
M. Obcena	Gr. 12 The Writer's Craft (University Preparation) Curriculum Leader
A. De Marchi	Gr. 12 Economics (University Preparation) Curriculum Leader

Table 2. KBCA school teams.

## Project Plan

The overall project plan was as follows:

Dec. 10, 2008	<p><b>Phase 1: Introduction to Constructivist Knowledge Building Pedagogy &amp; Knowledge Forum (Supply Coverage Day #1)</b></p> <ul style="list-style-type: none"> <li>▪ 1 Full-day PD session for a pair of teachers and a Teacher-Librarian (TL) from each school</li> <li>▪ Technical usage of Knowledge Forum (online discussion environment)</li> <li>▪ AM: visit to the Institute of Child Study (ICS) lab school to observe implementation of Knowledge Forum with elementary students</li> <li>▪ PM: visit OISE computer labs, ICT Instructional Leader (IL) delivers: (1) debrief of ICS lab school visit, (2) technical training in Knowledge Forum</li> </ul>
Dec. 17, 2008	<p><b>Phase 2: Project Design (Supply Coverage Day #2)</b></p> <ul style="list-style-type: none"> <li>▪ Backward map a curricular unit and design assessment and evaluation strategies</li> <li>▪ Submit potential culminating activity (CA) or performance task (PT) idea</li> <li>▪ Timelines are set</li> <li>▪ Content, process, and product are defined</li> <li>▪ Teachers continue building online learning environment in Knowledge Forum</li> <li>▪ Review potential CA/PT idea with individual teachers</li> </ul>
Jan. 15, 2009	<p><b>Phase 3: ICT Integration (Supply Coverage Day #3)</b></p> <ul style="list-style-type: none"> <li>▪ ICT IL delivers training of: Audacity, Blogger, Box.net, Comic Life, Photo Story, copyright issues regarding image and sound files</li> <li>▪ Hands-on workshop, teachers create their assignments along with exemplars to relate to their assessment and evaluation of the unit</li> <li>▪ Review CA/PT with individual teachers</li> </ul>
<p><i>Middle School</i></p> <ul style="list-style-type: none"> <li>▪ Feb. 4, 2009</li> </ul> <p><i>Secondary School</i></p> <ul style="list-style-type: none"> <li>▪ Feb. 24, 2009</li> </ul>	<p><b>Phase 4.1: Knowledge Building Introduction for Students</b></p> <ol style="list-style-type: none"> <li>1. ICT IL introduces students of all 4 classes to Knowledge Forum; students have already been introduced to the concept of Knowledge Building by their teacher</li> </ol> <p><b>Data Collection</b></p> <ol style="list-style-type: none"> <li>2. <i>Teacher Online Pre-Survey.</i> Teachers and Teacher-Librarians to</li> </ol>

	<p>complete an online pre-survey gauging comfort level with using various technologies (e.g. Knowledge Forum, Audacity, Comic Life, podcasting, blogging, and online video sharing), and feelings about integrating new methods and tools into their teaching practice (e.g. computers, constructivist knowledge building, podcasting, digital comic creation). 1 pre-survey per school team (i.e. 2 surveys in total).</p> <ol style="list-style-type: none"> <li>3. <i>Student Online Pre-Survey</i>. Students to complete an online pre-survey gauging computer and internet accessibility at home, internet usage trends, and comfort level with using various technologies (e.g. Comic Life, Photo Story, podcasts, Audacity, and Blogger). 1 pre-survey per class (i.e. 4 surveys in total).</li> <li>4. <i>Teacher Reflection Interview #1</i>. Video-record interviews of teachers. Questions:       <ol style="list-style-type: none"> <li>a) What are your thoughts and feelings about incorporating constructivist knowledge building into your teaching practice?</li> <li>b) <i>Middle school teachers only</i>: What are your thoughts and feelings about incorporating digital comic creation and digital photo story creation into your culminating activity?</li> <li>c) <i>Secondary school teachers only</i>: What are your thoughts and feelings about incorporating podcasting into your culminating activity?</li> <li>d) What sorts of challenges do you think lie ahead?</li> </ol> </li> <li>5. <i>Student Reflection Interview #1</i>. Video-record interviews of 3 designated students per class. Questions:       <ol style="list-style-type: none"> <li>a) How do you feel about using Knowledge Forum for your learning?</li> <li>b) What challenges do you think you'll face using Knowledge Forum for your learning?</li> </ol> </li> <li>6. <i>Teacher Online Pre-Survey</i>. All teachers and teacher-librarians to complete an online pre-survey gauging comfort level with using various technologies (e.g. Knowledge Forum, Audacity, Comic Life, podcasting, blogging, and online video sharing), and feelings about integrating new methods and tools into their teaching practice (e.g. computers, constructivist knowledge building, podcasting, digital comic creation). 1 pre-survey per school team (i.e. 2 surveys in total).</li> <li>7. <i>Student Online Pre-Survey</i>. All students to complete an online pre-survey gauging computer and internet accessibility at home, internet usage trends, and comfort level with using various technologies (e.g. Comic Life, Photo Story, podcasts, Audacity, and Blogger). 1 pre-survey per class (i.e. 4 surveys in total).</li> </ol>
<p><i>Middle School</i>        ■ Feb. 18, 2009</p> <p><i>Secondary School</i>        ■ Apr. 1, 2009</p>	<p><b>Phase 4.2: KF Assessment Tools &amp; Knowledge Building Follow-Up #1</b></p> <ol style="list-style-type: none"> <li>1. Follow-up session with students in all 4 classes to see Knowledge Building progress in Knowledge Forum and further develop quality of Knowledge Building (i.e. 12 Knowledge Building principles, PQP → Praise, Question, Propose)</li> <li>2. Introduce students to Knowledge Forum's assessment tools</li> </ol>



	<p><b>Data Collection</b></p> <p>3. <i>Teacher Reflection Interview #2</i>. Video-record interviews of teachers. Questions:</p> <ol style="list-style-type: none"> <li>How would you describe the progress of your own teaching in the Knowledge Forum (KF) environment?</li> <li>How would you describe your students' knowledge building progress in the KF environment?</li> <li>What seems to be working?</li> <li>What are some of your challenges?</li> </ol> <p>4. <i>Student Reflection Interview #2</i>. Video-record interviews of 3 designated students per class. Questions:</p> <ol style="list-style-type: none"> <li>How has your learning developed since you started using Knowledge Forum?</li> <li>How has your reading and writing developed since you started using Knowledge Forum?</li> <li>So far, how has Knowledge Forum helped you in your learning?</li> </ol>
<p><i>Middle School</i></p> <ul style="list-style-type: none"> <li>▪ Mar. 27, 2009</li> <li>▪ Mar. 31, 2009</li> </ul> <p><i>Secondary School</i></p> <ul style="list-style-type: none"> <li>▪ Apr. 8, 2009</li> </ul>	<p><b>Phase 4.3: Knowledge Building Follow-Up #2</b></p> <p><b>Data Collection</b></p> <p>1. <i>Teacher Reflection Interview #3</i>. Video-record interviews of teachers. Questions:</p> <ol style="list-style-type: none"> <li>You've now completed your time in working in the Knowledge Forum environment with your students. How have you grown professionally through this experience?</li> <li>Your students have now completed their Knowledge Building activities using the Knowledge Forum environment. How have your students grown through this experience?</li> <li>If you could start your students all over again in Knowledge Forum, what would you do differently?</li> <li><i>Middle school teachers only</i>: After having your students collaboratively construct their knowledge within Knowledge Forum, what effects might this have on the final Comic Life pieces and digital videos that your students will be creating next?</li> <li><i>Secondary school teachers only</i>: After having your students collaboratively construct their knowledge within Knowledge Forum, what effects might this have on the final podcasts that your students will be creating next?</li> </ol> <p>2. <i>Student Reflection Interview #3</i>. Video-record interviews of 3 designated students per class. Questions:</p> <ol style="list-style-type: none"> <li>After participating in Knowledge Forum, how have you grown as a learner?</li> <li>How have you grown as a reader and writer?</li> <li><i>Middle school students only</i>: How do you feel about demonstrating what you've learned by creating a digital comic using Comic Life?</li> <li><i>Middle school students only</i>: What ideas have you got for your comic, to show all that you've learned, while at the same time, making it creative and interesting?</li> </ol>

	<p>e) <i>Secondary school students only:</i> How do you feel about demonstrating what you've learned by creating a podcast?</p> <p>f) <i>Secondary school students only:</i> What ideas have you got for your podcast, to show all that you've learned, while at the same time, making it creative and interesting?</p>
<p><i>Middle School</i>        ▪ Mar. 31, 2009</p> <p><i>Secondary School</i>        ▪ Apr. 15, 2009        ▪ Apr. 16, 2009</p>	<p><b>Phase 5.1: Final Product Technical Training for Students</b></p> <ol style="list-style-type: none"> <li>1. By now, students have:           <ul style="list-style-type: none"> <li>▪ created their script</li> <li>▪ created their storyboard</li> <li>▪ gathered their necessary media (i.e. image or sound files)</li> </ul> </li> <li>2. ICT IL introduces students of all 4 classes to the software they will be using to create their final product (i.e. Comic Life or Audacity)</li> <li>3. ICT IL discusses copyright issues and provides copyright-free image and sound resources</li> </ol>
<p><i>Middle School</i>        ▪ Mid Apr. 2009</p> <p><i>Secondary School</i>        ▪ Apr. 21, 2009</p>	<p><b>Phase 5.2: Final Product Production Follow-Up</b></p> <ol style="list-style-type: none"> <li>1. Follow-up session with classes as necessary to see podcast and/or digital comic production progress and provide further instructional support as necessary.</li> </ol> <p><b>Data Collection</b></p> <ol style="list-style-type: none"> <li>2. <i>Teacher Reflection Interview #4.</i> Video-record interviews of teachers. Questions:       <ol style="list-style-type: none"> <li>a) Congratulations! You've completed the KBCA project with your students! How have you, as a teacher, benefitted or grown from participating in this project?</li> <li>b) How have your students benefitted or grown from participating in this project?</li> <li>c) If this project were to run again, what suggestions for improvement might you have?</li> </ol> </li> <li>3. <i>Student Reflection Interview #4.</i> Video-record interviews of 3 designated students per class. Questions:       <ol style="list-style-type: none"> <li>a) <i>Middle school students only:</i> Now that you've finished your digital comic to show what you've learned, what do you think about the work that you did?</li> <li>b) <i>Secondary school students only:</i> Now that you've finished your podcast to show what you've learned, what do you think about the work that you did?</li> <li>c) How did you make your final product interesting enough to sustain your audience's attention?</li> <li>d) How has the creation of this final product helped you grow as a reader and a writer?</li> </ol> </li> <li>8. <i>Teacher Online Post-Survey.</i> All teachers and teacher-librarians to complete an online post-survey gauging comfort level with using various technologies (e.g. Knowledge Forum, Audacity, Comic Life, podcasting, blogging, and online video sharing), and feelings about integrating new methods and tools into their teaching practice (e.g. computers, constructivist knowledge building, podcasting, digital comic</li> </ol>

	<p>creation). 1 pre-survey per school team (i.e. 2 surveys in total).</p> <p>9. <i>Student Online Post-Survey</i>. All students to complete an online post-survey gauging comfort level with using various technologies (e.g. Knowledge Forum, Comic Life, Photo Story, podcasts, Audacity, and Blogger), and meta-cognition of their own growth as a learner, literacy skills, and growth in the topic of study addressed via KBCA. 1 pre-survey per class (i.e. 4 surveys in total).</p>
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Table 3. KBCA Project Plan.

### **Phase 1: Introduction to Constructivist Knowledge Building Pedagogy & Knowledge Forum**

Both school teams were brought together for the first time in early December 2008 for our first of three supply coverage days. We spent the morning at the Institute of Child Study (ICS) Lab School ([http://www.oise.utoronto.ca/ics/ICS\\_Lab\\_School/index.html](http://www.oise.utoronto.ca/ics/ICS_Lab_School/index.html)), where the Vice Principal, Richard Messina, gave a presentation about the school's philosophy – constructivist knowledge building. Richard then led us to a grade 3 classroom and a grade 5 classroom.

In these classrooms, our group of educators observed and interacted with the students in various constructivist knowledge building activities including partner research, small group discussion, and active participation in an online discussion environment called Knowledge Forum (<http://www.knowledgeforum.com>). The children were very articulate and eager to share what they were working on with us, and they were happy to show us how their ideas within their Knowledge Forum space were evolving. Although the ICS children we observed were much younger than the middle school and grade 12 students that this group of TDSB teachers work with, these teachers were nevertheless energized by what they observed and were excited about the potential that this approach offered for their own students.

Our visit at ICS ended with a Question and Answer period in which the grade 5 and grade 3 ICS teachers met with our 2 school teams to address any concerns

about the implementation of constructivist knowledge building pedagogy in the classroom. This discussion proved to be very helpful to the TDSB teachers who, although excited to try this new approach, had some practical questions about how to “make this work”. Richard Messina’s advice was:

We need to reconcile them for ourselves – the demands of the curriculum, and yet, how do children really learn? I challenge you to pick 1 thing you do in the whole year, where they are able to explore something deeply...where children can show some direction in the design of it, where they can go deeply, and that they see you as a co-learner in that design, and that you are developing a collective understanding. It’s not that they’re trying to guess what’s in your head but that they are actually constructing this together. (*Richard Messina, Vice-Principal, ICS*)

As previously mentioned, students and teachers involved in this KBCA project would be collaborating in a cross-platform online environment called Knowledge Forum, to engage in active knowledge building through non-fiction writing. Note that constructivist knowledge building does not necessarily need a digital environment in which to occur, though knowledge building in a digital environment adds great benefits to teachers and learners alike. Furthermore, teachers and students of the KBCA project utilized the Knowledge Forum application as their digital environment for constructivist knowledge building, but any digital environment which allows for asynchronous threaded discussion can be utilized for this purpose.

To debrief what we had just seen during our ICS visit as well as to immerse the six TDSB teachers involved in the KBCA project in the Knowledge Forum environment, we next went to a computer lab at the Ontario Institute for Studies in Education of the University of Toronto (OISE/UT), where I did a half-day training session with these teachers on how to use Knowledge Forum. The objective was to train the teachers on how to use Knowledge Forum, and to have them collaboratively build knowledge in Knowledge Forum. Furthermore, the Teacher-Librarians at each school were given some extra training, including

Knowledge Forum account management, to establish them as the Knowledge Forum “go-to” person at their school. The very first task that these teachers were given was to answer three questions which were designed to help them connect their new learnings from their ICS visit to their current teaching practice, help them think about what new approaches they wanted to incorporate into their current practice, and probe them for their initial anxieties:

1. *Alignments* - “After visiting ICS, what did you see and/or learn there that aligns with your current teaching practice? Please Build-on to this note, then respond to two other notes in this view.”
2. *I want to try...* - “After visiting ICS this morning, what new pedagogy and/or practice(s) would you like to incorporate into your own teaching? Please Build-on to this note, and respond to 2 other notes in this view.”
3. *Challenges Ahead* - “After visiting ICS this morning, what challenges do you foresee in doing Knowledge Building and/or Knowledge Forum with your students back at your own school? Please Build-on to this note, and respond to at least 2 other notes in this view.”

Each of these three questions was a separate “note” to which the six teachers responded. Below is an image of this Knowledge Forum “view” (screen) in which these asynchronous online discussions took place. Each red square represents a “note” that has been read by the user (a square will be green if it has not been read yet). Beside each note is the title of the note and the author’s username. The blue arrows indicate which notes respond to which.

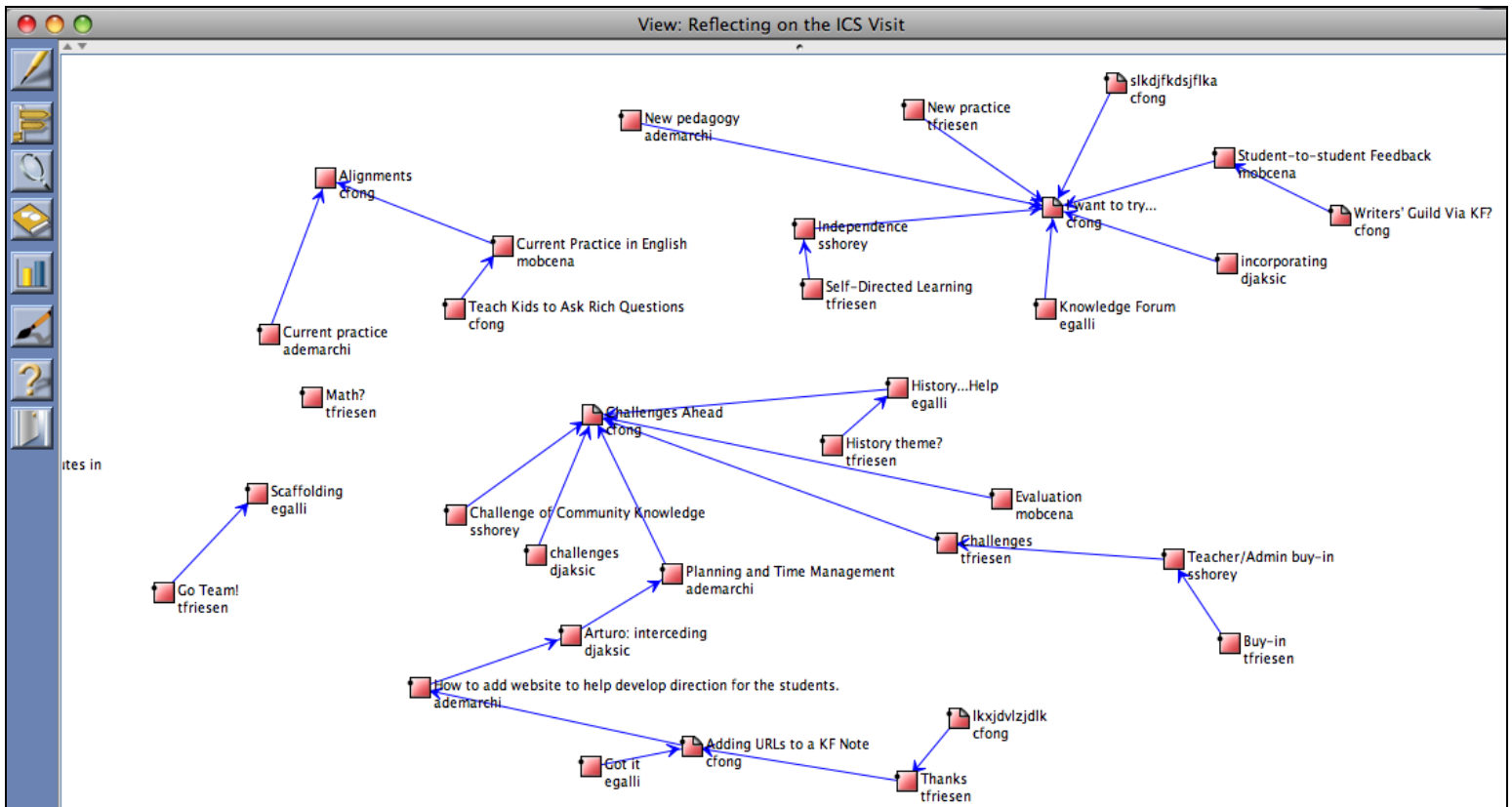
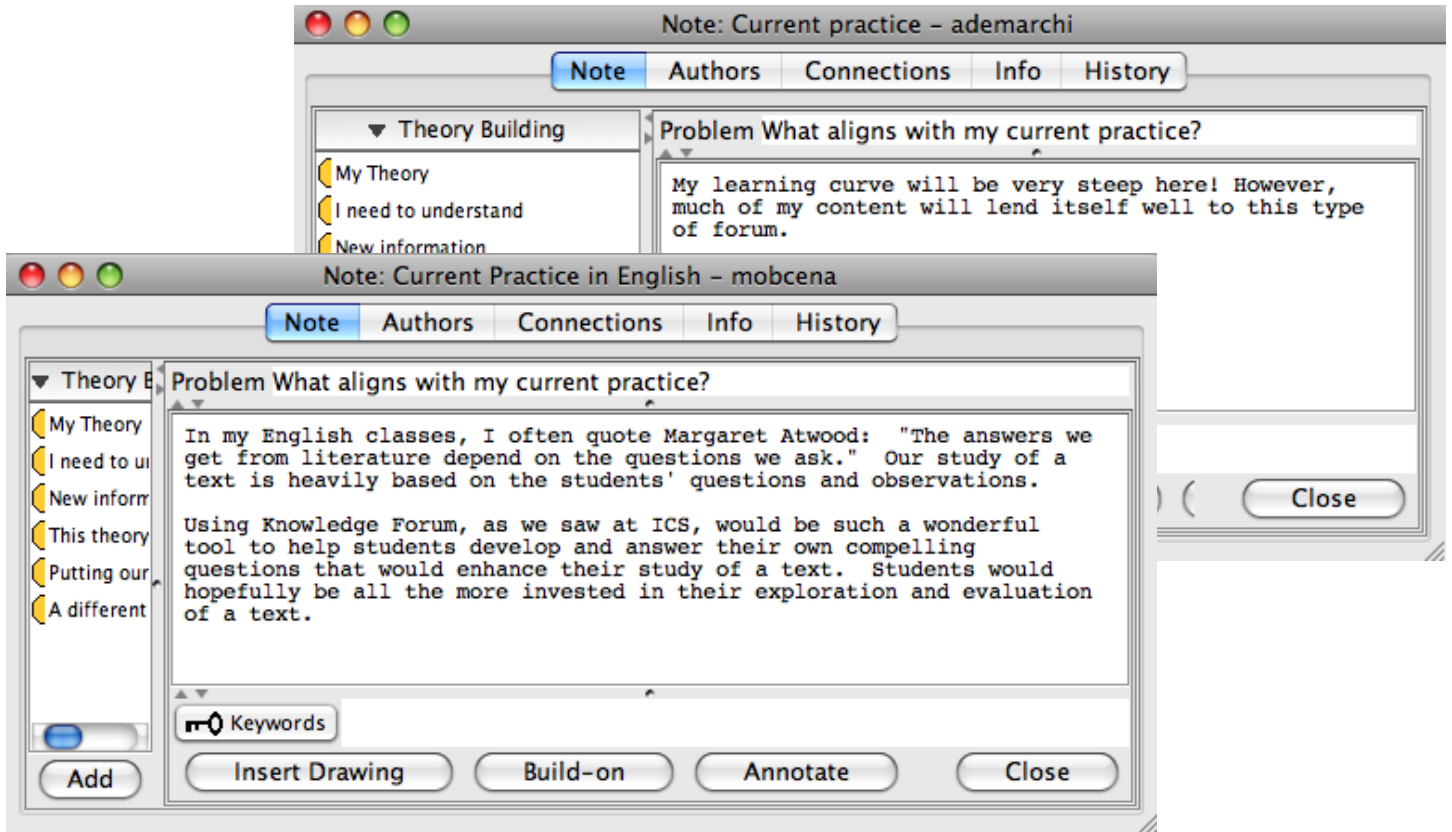
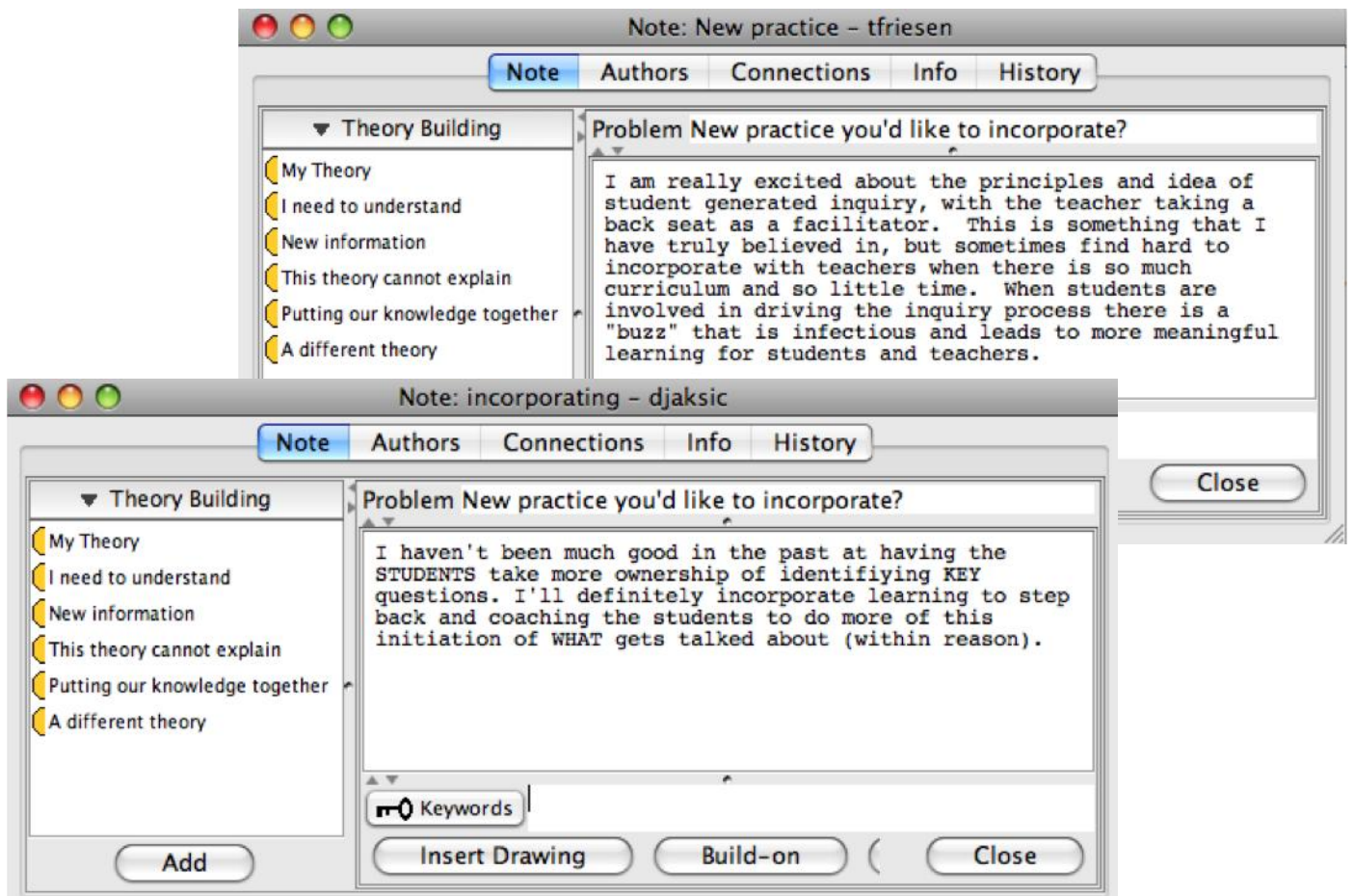


Figure 1. A Knowledge Forum “view” in which KBCA teachers worked after visiting ICS.

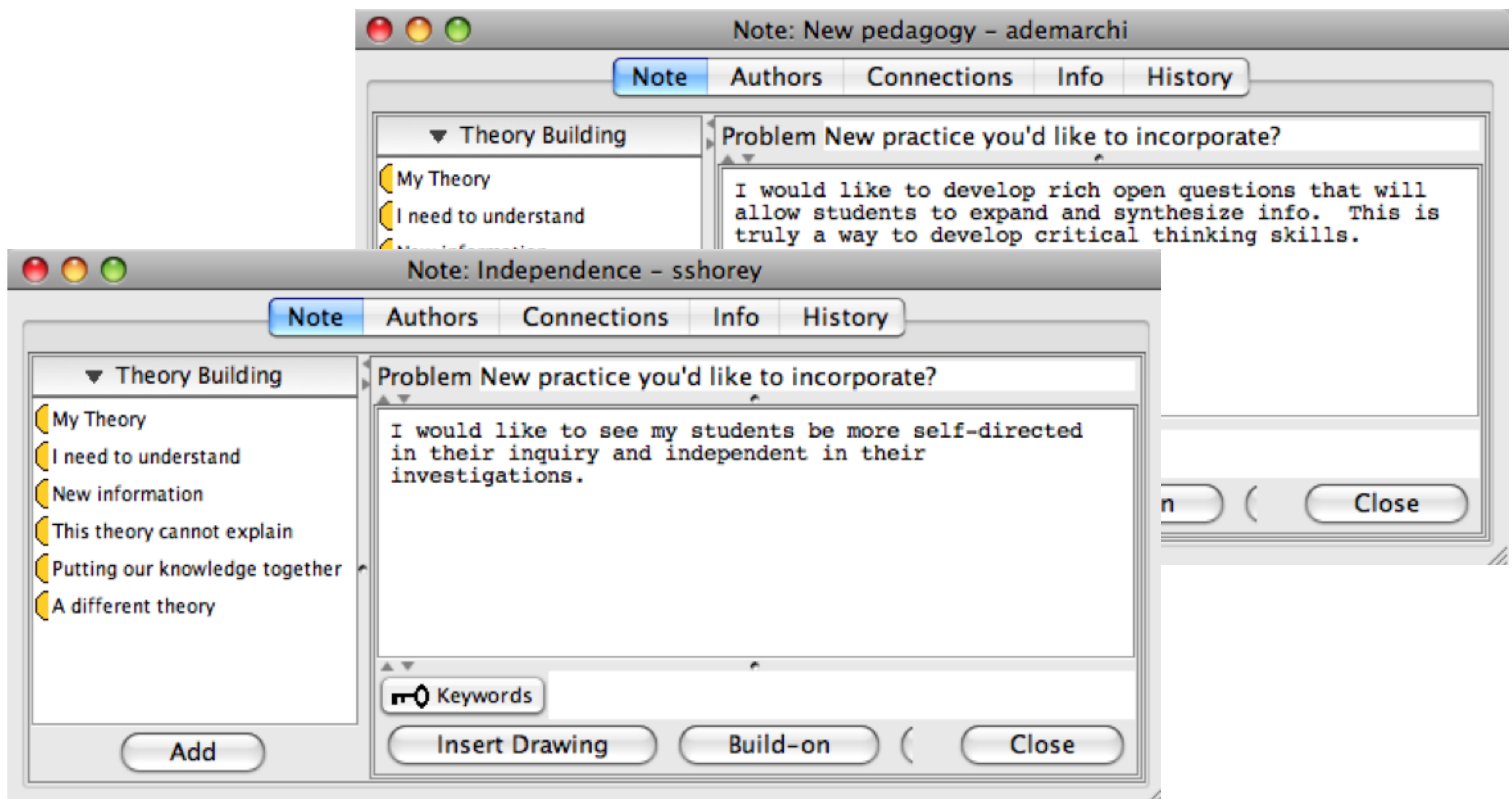
Below are images of teachers’ Knowledge Forum notes. The left panel of a note is a menu of “scaffolds” inherent in the Knowledge Forum software, designed to help learners work with their ideas and new knowledge to arrive at deeper understanding. These scaffolds are modifiable. Both grade 12 teachers were already beginning to see how they could incorporate the use Knowledge Forum for collaborative knowledge building activities with their students.



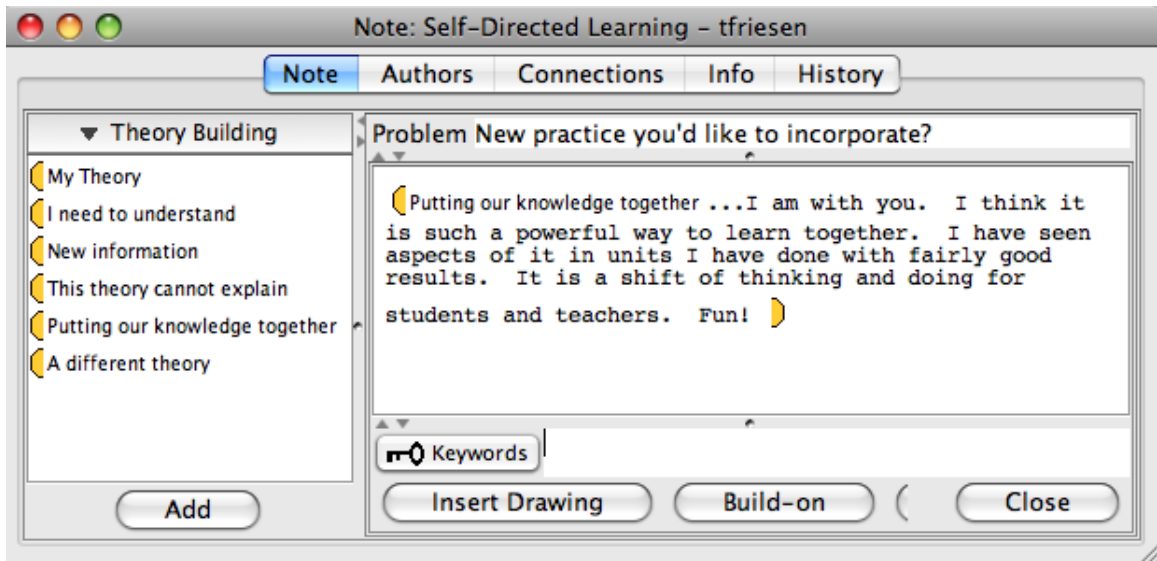
In terms of incorporating new constructivist pedagogy into their teaching practice, these teachers were keen to give it a try while also acknowledging the realities of time constraints and alluding to their own discomfort. Both of the Teacher-Librarians recognized that participation in the KBCA project would require all teachers to shift from being the “sage on the stage” to the “guide on the side”, and were open to making this role shift:



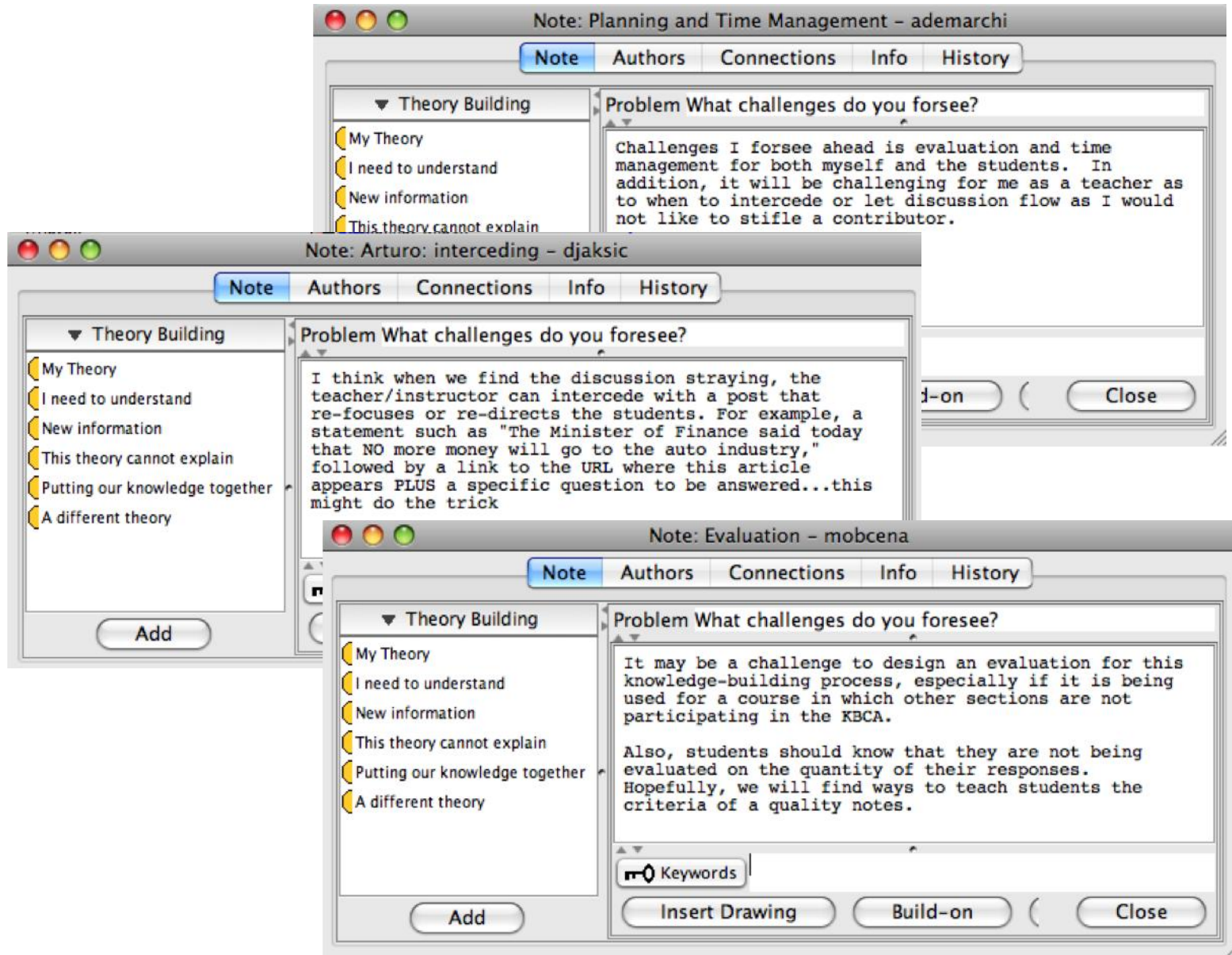
The classroom teachers were already beginning to conceive of a new role for themselves and for their students:

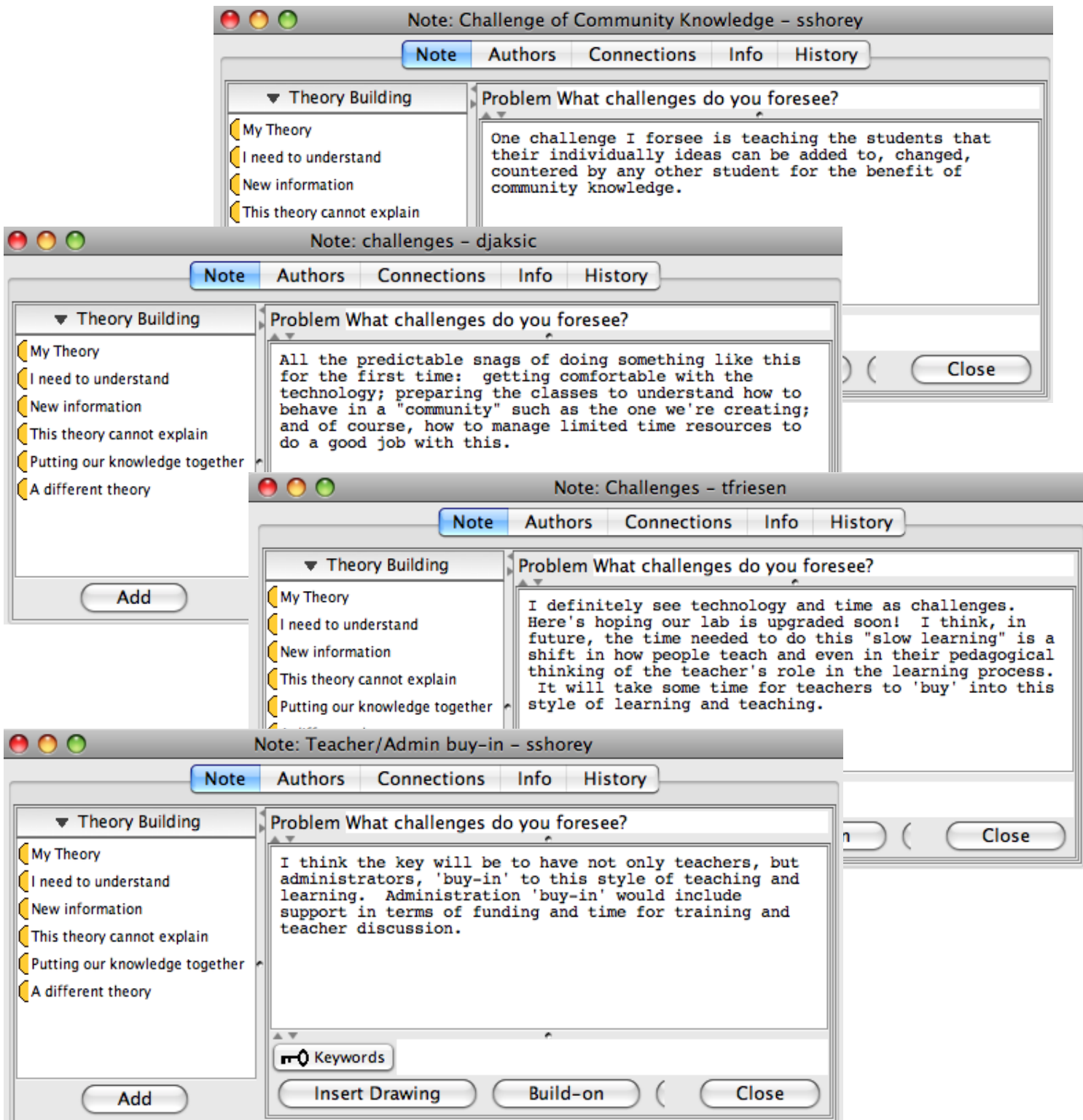






When asked about foreseeable challenges in taking a constructivist knowledge building approach to teaching and using Knowledge Forum with their students, the teachers named planning, time constraints, effective teacher facilitation, evaluation, student efficacy as a result of having one's ideas improved upon by other students, technological concerns, and teacher/administration "buy-in":





## Phase 2: Project Design

The second supply coverage day for the 6 teachers involved in the KBCA project occurred 1 week later. The objectives of this day were:

- Classroom teachers to collaborate with their Teacher-Librarian and ICT IL to backward map a curricular unit, and design assessment and evaluation strategies
- Submit potential culminating activity (CA) or performance task (PT) idea
- Set timelines
- Define content, process, and product
- Teachers continue building online learning environment in Knowledge Forum
- IL to review potential CA/PT idea with individual teachers

The teachers were also introduced to what is known in the Toronto District School Board (TDSB) as the “4-Stage Research Process”. To support teachers in the research The TDSB’s Library and Learning Resources department have created separate research guides for the elementary panel, *Imagine the Learning* (2006), and the secondary panel, *Research Success* (2005); which contain many student-friendly blackline masters. Both these documents are based upon the OSLA’s Inquiry and Research model (1998).

As an example of the types of performance tasks / culminating activities that were designed, the table below summarizes each KBCA class’ task/activity scenario.

Ontario Curriculum To Be Addressed & Teacher	Performance Task / Culminating Activity Scenario
<b>Gr. 6 Language Arts &amp; Social Studies (Heritage &amp; Citizenship: First Nation Peoples and European Explorers)</b>	You are a famous comic book author! You’ve been hired to create an entertaining and educational comic about Canada’s Aboriginal peoples. To be successful, you need to research daily life in an Aboriginal settlement. You will need to research the geography, language, agriculture, wildlife, shelter, clothing, transportation, governance, recreation, and spiritual beliefs of a specific Aboriginal settlement. Good luck!

<b>S. Shorey</b>	
<b>Gr. 8 Language Arts &amp; History (Confederation)</b>	Since you played an important part in the success of Canada's confederation, you have been approached to be a member of a consulting panel to assist the governments in the process of uniting a group of islands that are in the initial stages of becoming a country. Your expertise of what went wrong, what worked well and the process during the unifying of Canada as a new country will be of great importance to the governments of these islands. Afterwards, you will be required to produce a manual to assist other countries who are in the process of unifying.
<b>E. Galli</b>	
<b>4U (Gr. 12) The Writer's Craft</b>	You have been hired by the CBC to host "The Write Stuff," a podcast which is written by teens, for teens. These podcasts will feature authors you admire and examples of "good writing." Each podcast will analyze how one author and/or work of writing has inspired you to write. Your podcast should be 2 minutes in length.
<b>M. Obcena</b>	
<b>4U (Gr. 12) Economics</b>	We have established a colony on the moon and you have been appointed by the United Nations to suggest a possible economic system that will make the Moon's economy prosper. Collect data from earth to help you determine your theory and develop and present a podcast regarding your theory. Your findings must be presented in a podcast to the United Nations in New York City. Your podcast must be 2-3 minutes in duration.
<b>A. De Marchi</b>	

Table 2. KBCA Performance Task / Culminating Activity Scenarios.

### Phase 3: ICT Integration

The third and final supply coverage day occurred 1 week after returning from the winter holidays. The objectives of this day were:

- ICT IL delivers training of: Audacity, Blogger, Box.net, Comic Life, Photo Story, copyright issues regarding image and sound files
- Hands-on workshop, teachers create their assignments along with exemplars to relate to their assessment and evaluation of the unit
- Examine good questioning techniques – how to create good questions for students, and how to teach student to ask good questions
- ICT IL to review potential CA/PT idea with individual teachers



Figure 2. KBCA Teachers receiving ICT training.

To ensure that teachers had continuous online support with respect to the use and creation of blogs and podcasts, I created 2 interactive tutorial blogs, which I encouraged them to use with their students:

- <http://tdsblogging.blogspot.com>
- <http://www.podvodcasting.blogspot.com>

### *Facilitating Rich Discussions with Rich Questioning*

In order to encourage higher order thinking skills and facilitate rich discussions in the Knowledge Forum views as well as in face-to-face KB talks in the classroom, questioning skills of both the facilitator as well as the learners become crucial.

Helpful resources to this end include:

- Koechlin, C. & Zwaan, S. (2006). *Q Tasks: How to empower students to ask questions and care about answers*. Markham, Ontario: Pembroke Publishers Limited.
- Essential Questions: <http://questioning.org/mar05/essential.html>
- The (Merely) Demanding Question:  
<http://questioning.org/sept06/demanding.html>
- A Question Toolkit: <http://www.fno.org/nov97/toolkit.html>
- Question Matrix:  
<http://www.decs.sa.gov.au/assessment/pages/assessmentstrategies/question/?reFlag=1>

We examined rich questioning techniques and it was suggested that this should be taught at the start of a knowledge building unit and continuously reinforced throughout the community knowledge building process. This aligns nicely with “Stage 1: Preparing for Research” of the 4-stage Ontario School Library Association inquiry and research model (1998). Furthermore, rich questioning is a skill that experts and researchers at the cutting edge of their disciplines must employ to continually push the frontiers of their discipline. By nurturing this skill from a young age, we are preparing our learners to be knowledge workers in the

knowledge society – where “knowledge is a flexible, fluid, ever-expanding, and ever shifting resource” (Hargreaves, 2003, p. 16).

Some time after this training day, all KBCA teachers were asked to complete an anonymous online pre-survey to gauge comfort level with the new technologies as well as to probe for how they felt about implementing constructivist knowledge building, digital comic production, and/or podcasting into their teaching practice. What follows are some of the pre-survey questions and teachers’ corresponding remarks.

- What are your thoughts and feelings about incorporating constructivist knowledge building into your teaching practice?
  - “I wish I had more experience with KB before teaching my students to use it. Essentially, we are learning together on this project.”
  - “I am seeing the benefits of constructivist knowledge building. I am still learning how to incorporate teaching and learning style. It is a shift in how I teach and in how students learn. I am learning to let go of being at the centre of the teaching experience and letting the learning happen. I think with more time, constructivist knowledge building will be a part of my classroom experience.”
  - “Very good, but only if it (Knowledge Forum) is up and running on a consistent basis!”
  - “Quite frankly, what I’m drawn to is the inherent ‘democracy’ of the philosophy behind ‘constructivist knowledge building.’ If there’s one thing human society needs more of, in my view, is lucid, cogent challenging of the status quo which has brought us to where Mankind is today...a place not be bragged about.”
  - “I can see endless applications with this strategy and can easily apply it into my teaching practice.”

- *Middle School Teachers Only:* What are your thoughts and feelings about incorporating digital comic creation and digital photo story creation into your culminating activity?
  - “I feel very comfortable with both software because I have used them in my teaching practice.”
  - “I believe this is an effective way to get students to create! I have seen students engaged in what they are doing. No one seems to be left behind. They take more ownership and pride in what they are doing and what they are handing in.”
- *Secondary Teachers Only:* What are your thoughts and feelings about incorporating podcasting into your culminating activity?
  - “While these aren't my classes, I can say that ANY original creation on behalf of students (and, really, with the right parameters, the podcasts can't help but be original creations) are inherently 'good' learning.”
  - “Actually none of my students know anything about producing podcasts so it will be a challenge to meet timelines. Otherwise, I believe that this will be beneficial for my students and myself.  
Thank you for taking the time to help us broaden our perspective.”

#### **Phase 4.1: Knowledge Building with Students**

With classroom teachers on hand to observe and participate in the lesson, I visited each of the 4 participating KBCA classes (2 classes per school) in their school's computer lab, and did an introductory lesson on how to use Knowledge Forum (KF). Each class had their own space that could be visible by the other KBCA class in the same school. All teachers were able to view all class KF spaces, regardless of what school they belonged to. It was deliberately organized this way to allow teachers and students to see how others were knowledge building.

Each class' KF space contained on “View” (screen) which I called the “Sandbox”. In this space, I pre-posted 3 notes which asked the students about their initial



thoughts about Knowledge Forum, how they think KF might help them in their learning, and what are some foreseeable challenges with working in KF. As students played with the various new KF tools I introduced, they addressed these questions. Initial student postings to KF invariably will be of lower quality and will demonstrate a significant amount of technical “messaging around” and casual instant messaging lingo. The Sandbox area is a wonderful place for students to explore the tools of their new digital environment.

Students and teachers were made aware that clicking on the question mark icon in Knowledge Forum’s left menu bar would bring them to Knowledge Forum’s “Help” website (<http://ikit.org/kf/48/help>) which includes video tutorials. As the students experiment in the KF environment, I circulate the computer lab to find 2 or 3 students who seem technically savvy and particularly comfortable with KF. These students become the class’ designated “Go To” people if anybody needs technical assistance, and are given a little extra technical training during this time. Introducing this extra layer of technical support within the class serves to put the rest of the class and the teacher at ease.

After a short period of individual experimentation in KF, I usually launch into a discussion about the difference between informal and formal writing. This is also a good time to make students aware of who in the world is able to read their postings, and how long their postings will stay “out there” in cyberspace. These are important issues to discuss! Since our digital learners spend so much of their time outside of school on digital social platforms such as MSN and Facebook, they often have a false sense of internet privacy/security, a blurred distinction between what constitutes informal and formal interactions through different writing styles, and confusion about when it is appropriate to use informal and formal writing styles.

As students continue to explore and experiment with KF while responding to my 3 questions and to each other’s responses, I usually begin to introduce some basic knowledge building principles. Marlene Scardamalia (2002) has created 12

Knowledge Building Principles and these were introduced to all KBCA teachers during their training days. While I do think it is worthwhile to gradually teach these principles to students if they will be knowledge building over the better part of a school year, it could be too much to handle for students who are just beginning to learn how to collaboratively construct knowledge. To avoid overwhelming the students but in keeping with the spirit of Scardamalia's Knowledge Building Principles, I posted 3 "A" statements in each class' main KF view:

1. All ideas are accepted.
2. All ideas are improvable.
3. All ideas become "knowledge artefacts/objects", and belong to the Knowledge Building Community.

With respect to #3, and aligning with knowledge building pedagogy, I tell students that once they post their idea as a note in KF, that idea is no longer "theirs". The idea becomes its own entity - a "knowledge artefact" and therefore the knowledge building community has the responsibility of improving upon that idea – just as they are responsible for improving all the other posted ideas that were written by other community members. This is key in helping students not to take it personally should "their" idea get improved upon by other classmates. More importantly, it teaches students that ideas are incredibly important and gives them a sense that ideas are at the centre of their learning, rather than tasks/activities being at the centre of their learning. The combination of #2 and #3 actually works to embed collaborative assessment, as the students learn not to take things at face value and to judge the validity of what they read. The corollary to this of course, is that students will take extra care to contribute well thought out and well-supported notes because they are acutely aware that their peers will be considering their contributions seriously. Furthermore, since they understand that they collectively are 1 knowledge building community, a spirit of co-operative learning and inclusive responsibility is instilled.

To provide students with a framework for composing a quality note contribution/response, they were taught to do “PQP”:

- **Praise:** state what you think is a good idea, a helpful piece of information, or a point you agree with.
- **Question:** ask a question that will prompt you and the rest of the knowledge building community to think deeper about the issue, or a question to help clarify a point.
- **Propose:** suggest a new idea, new information, new strategy, or new approach to solve your current problem of understanding.

Both students and teachers have found this acronym to be particularly helpful. It is interesting to note that the middle school students often had socio-emotional difficulty with composing a “Praise” statement when responding to a classmate’s note – even in written form! It is possible that this may be due to issues related to their adolescent developmental stage, or perhaps the inner-city peer culture of one-upmanship in which these students lived, or some combination of both. Whatever the case may be, it is all the more reason to encourage these students to demonstrate some positive reinforcement towards their peers’ contributions to the knowledge community.

Finally, I reminded students that some of their knowledge building (KB) would continue outside of their digital Knowledge Forum environment – in face-to-face knowledge building discussions called “KB Talks”. During KB talks, the 3A’s and PQP still apply! Figures 3 and 4 show the Sandbox views of 2 classes. It is interesting to note that both grade 6 classes preferred the “As Icon” layout, whereas both grade 12 classes preferred the “As List” layout.

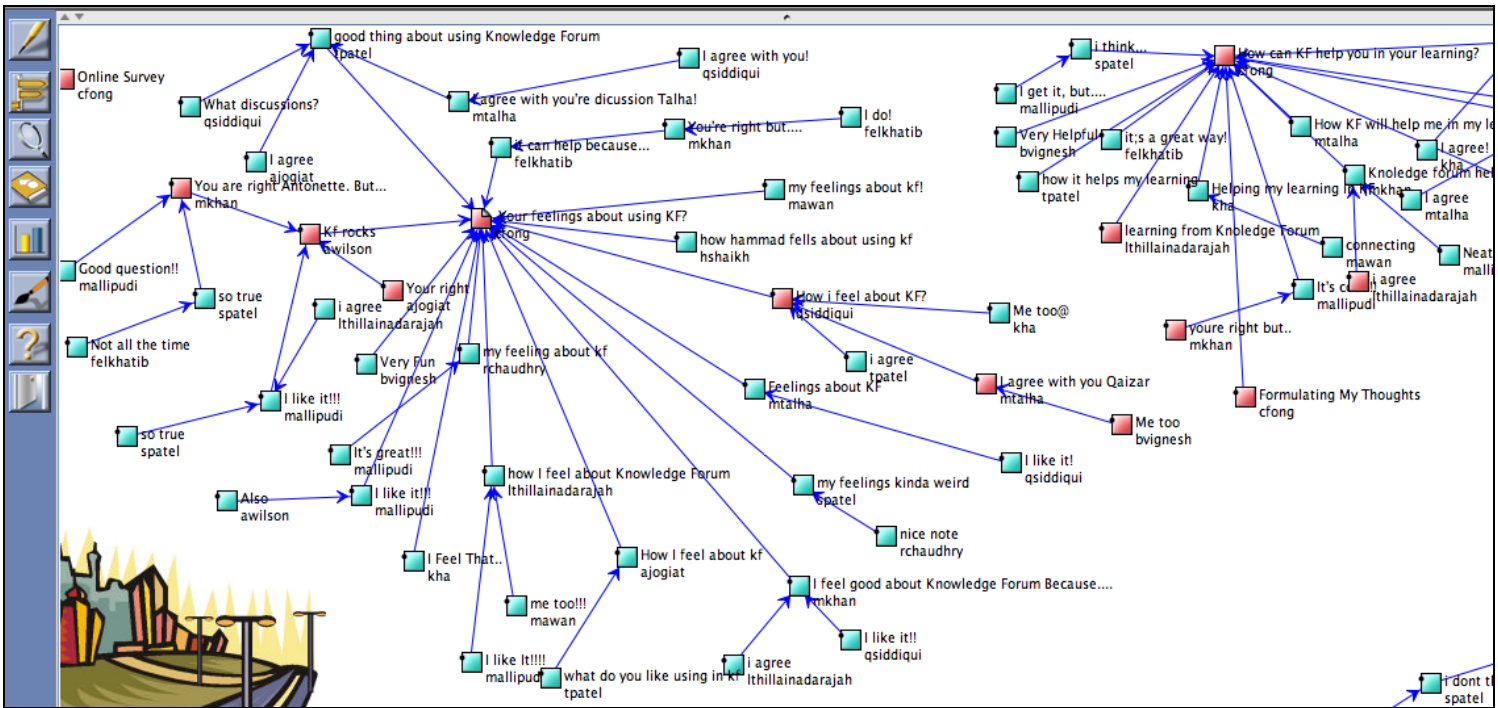


Figure 3. The grade 6 class' Sandbox view in KF ("As Icon" layout).

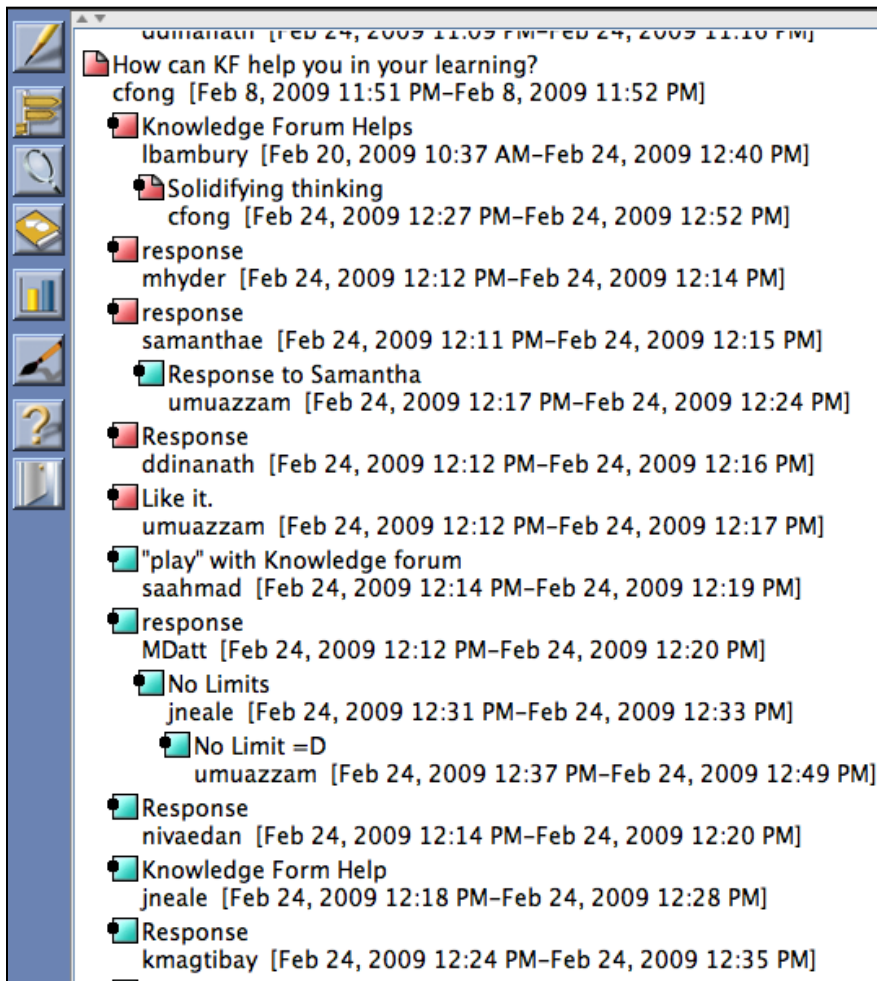


Figure 4. The Grade 12 Economics class' Sandbox view in KF ("As List" layout).

### *Phase 4.1 Teacher Reflections*

After the introductory Knowledge Forum lesson, teachers remained excited about undertaking a new approach to teaching, and were excited for the new learning opportunity in Knowledge Forum they could provide their students:

When I'm not in control, it frightens me. What I'm used to is sharing my knowledge with the students. With this (constructivist knowledge building), they're sharing their own knowledge. I'm guiding them as opposed to just strictly teaching them...What's really important to be able to teach the students before they even start, is good questioning techniques. *(E. Galli, grade 8 teacher)*

Moving away from teacher-centred learning to student-centred learning...is actually very helpful for students in this day and age who require a lot more than just the teacher's response. So the whole class is working together to build knowledge. *(M. Obcena, grade 12 Writer's Craft teacher)*

When asked about foreseeable challenges, teachers mentioned their own and their students' having to adjust to the pedagogical approach. The secondary teachers could see that this new way of teaching could potentially be more time consuming and had some concerns about being able to cover the curriculum within the time they had. Finally, there were some concerns about learning the technology well enough to use it effectively for teaching and learning.

Using the constructivist theory, you have to post an idea, and then build onto it. And sometimes the students aren't necessarily used to the idea of their idea being taken by somebody else and adapted. So I think that will be challenging for the students, and for our class – to have those class discussions of, 'this is community knowledge'. *(S. Shorey, grade 6 teacher)*

...I want them to discover the knowledge. That is the philosophy behind this - is that the students will discover the knowledge. So how am I going to guide them to get there? *(S. Shorey, grade 6 teacher)*

What happens with Project-Based Learning is that there's always a balance that we have to keep in mind. When it comes to teaching this new technology (Knowledge Forum and podcasting) and covering the material for the course. I just hope that we'll continue to stay on track. *(M. Obcena, grade 12 Writer's Craft teacher)*

...because it's a new experience for myself and my students, the challenge will be understanding the technology and how to use the technology to be effective. (*A. De Marchi, grade 12 Economics teacher*)

With respect to having students create digital comics as a performance task, the middle school teachers were sure this would engage the students because their students enjoyed reading graphic novels. The secondary teachers saw having their students create podcasts as a culminating activity to be a relevant and authentic task for the current times we live in.

#### **Phase 4.1 Student Reflections**

Each classroom teacher chose 3 students from their class to would take part in video-recorded reflection interviews throughout the KBCA project. Following their introductory Knowledge Forum lesson, all the students were very excited about starting a project which integrated KF. The idea of adding to their peer's ideas, getting peer feedback, and having time to reflect on their own learning appealed to them. A couple of them were already beginning to see the value of being able to re-visit previous learning – a property of constructivist learning:

If you log out of MSN, you'll most likely not be able to see the same chat again, but with Knowledge Forum, you can see it, so you can always come back to it - which is pretty good! (*Sohum, grade 8 student*)

I feel pretty excited because I've never had an opportunity like this before to use technology and I think nowadays, kids like me – we're not really used to reading books and stuff, it might be a little boring. So it's exciting going to the computer and doing different things. (*Lathiha, grade 6 student*)

I think Knowledge Forum is a revolutionary tool in learning. Knowledge building gives you a chance to learn at home without having the teacher. Also, it's taking away the sage on the stage and becoming more the guide on the side, where the teacher just guides you, and you start learning from yourself and other peers. (*Chris, grade 12 Economics student*)

I think it's a great way to build on a lot of the things that I learn, and I'm able to always look back on it and even think about, 'Oh, I never

knew that I thought of that at one time!' (*Lakesha, grade 12 Writer's Craft student*)

I think that Knowledge Forum will help us with our course, because when we're on KF, talking with the other students, we're actually learning more because we're not only learning about what's in the textbook - we get to see the perspectives of all the other students and it really helps you when we're doing case study questions in our class. (*Thaksha, grade 12 Economics student*)

When asked about foreseeable challenges, they had concerns about the potential for online bullying in Knowledge Forum. Since Knowledge Forum only allows for asynchronous communication, any evidence of such inappropriate behavior would be visible to everyone who has access to their KF space – essentially, all the teachers and all the students in the class. This visibility is one safeguard and a further safeguard is that that all notes have a “History” feature which displays who authored and read the note, and at what time. Everything is stored on a server which is accessible by the Knowledge Forum technical support department.

Other concerns included access to Knowledge Forum at home, and low quality note contributions from peers which would not further the knowledge community's knowledge building efforts. To install Knowledge Forum on their home computers, students needed to have internet access at home and they needed to have the latest version of Java installed on their computer. Java can be downloaded for free from: <http://www.java.com>.

Knowledge building emphasizes quality over quantity. If that wasn't emphasized, then I think people would just go on and on and on, on their postings, and that would be a laborious process to read of all of that and then post - because if you don't read it, then you're not going to be staying up on the conversations. Another thing is that our ideas are spontaneous. So your ideas may lead to a great conversation, but there's also the bad route, where they might lead to digression. (*Chris, grade 12 Economics student*)

The only problem that we often face is that the window on the screen for Knowledge Forum is kind of confusing because all the notes and the dialogue boxes are out of place, but that's not a big deal because

once you take your time to organize it, it's great for everyone.  
(Mashiyat, grade 12 Economics student)

### Phase 4.2: KF Assessment Tools & Knowledge Building Follow-Up #1

2 weeks into their Knowledge Forum work, I re-visited all the classes to give some further instruction on PQP and the 3A's as mentioned in Phase 4.1. I also introduced the students to Knowledge Forum's 5 assessment tools, which can be accessed by students and teachers via the bar graph button on the left menu bar in the Knowledge Forum window. These assessment tools are:

1. Contribution
2. Semantic Overlap
3. Social Network
4. Vocabulary Growth
5. Writing

What follows is a brief summary of these 5 tools. For more information about any of these assessment tools, please see "Appendices" listed on Knowledge Forum's online help website: <http://ikit.org/kf/46/help/enhanced/>.

#### 'Contribution' Assessment Tool

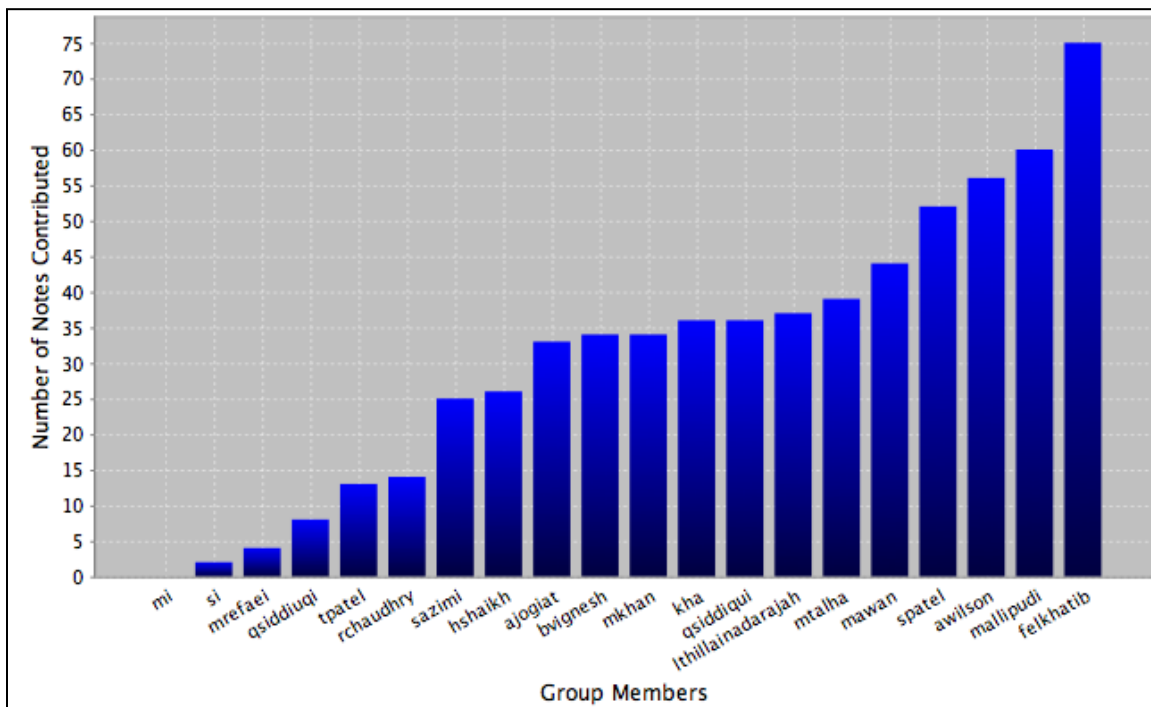




Figure 5. Knowledge Forum’s ‘Contribution’ assessment tool, showing number of notes and Build-On notes posted by grade 6 students in S. Shorey’s class.

The Contribution tool allows students and teachers to access data regarding the number and types of notes that have been read, contributed, or edited by individuals of a group within a Knowledge Forum database. When showing this tool to students, it is important to emphasize quality over quantity of notes. Students in other elementary classes in the past have used this tool to see who, in their class, might need more help or encouragement in becoming more active in the Knowledge Forum database.

### ‘Semantic Overlap’ Assessment Tool

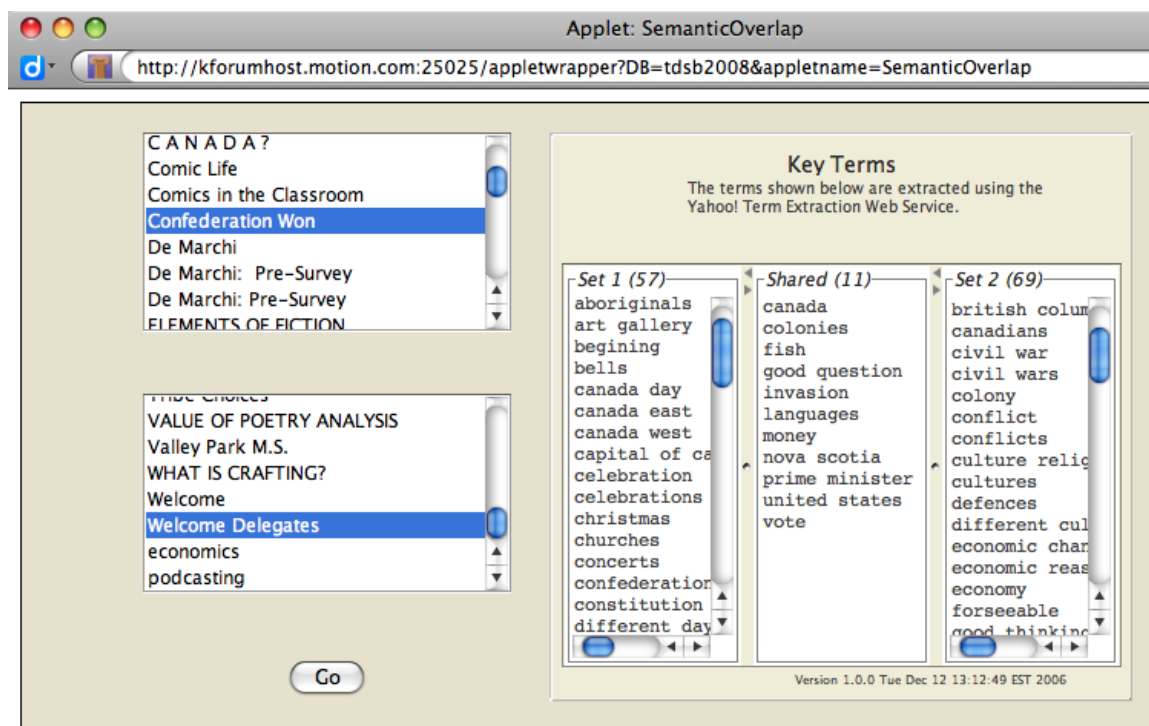


Figure 6. Knowledge Forum’s ‘Semantic Overlap’ assessment tool, showing key terms from the notes of 2 separate grade 8 KF views: “Confederation Won” and “Welcome Delegates”. The “Shared” column in the centre shows common key terms from both KF views which can indicate an overlap in ideas, theories, or topics.

The Semantic Overlap tool can be used to determine possible overlap in ideas, theories, or topics of 2 different Knowledge Forum views. This can be beneficial to students and teachers if they are trying to determine the evolution of an idea or

theory, or perhaps looking for further resources to consider as they work with their current knowledge and ideas.

*'Social Network' Assessment Tool*

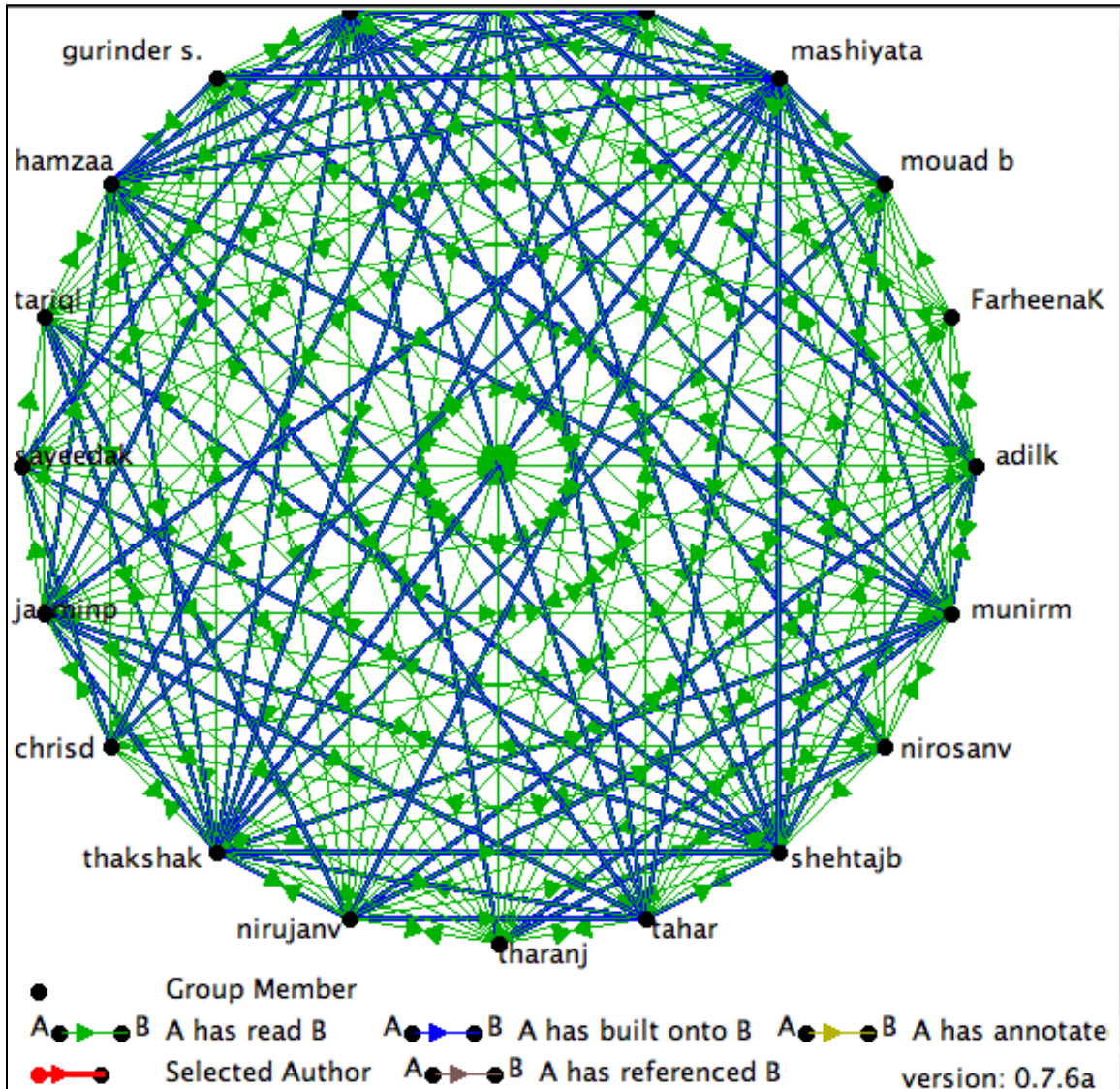


Figure 7. Knowledge Forum’s ‘Social Network’ assessment tool, showing the online social interactions of A. De Marchi’s grade 12 Economics class.

We see all the grade 12 Economics students’ usernames around the edge of the graph in figure 7. The green arrows indicate which students have read which other students’ notes. The blue arrows indicate which students have built upon which other students’ notes. We can see that although Farheena K has read many of her peers’ notes, she has not built upon anyone else’s notes, nor has

anyone built upon any of her notes. This is an indication that this student needs more support from the teacher and her peers to become more active in the community knowledge building process.

**‘Vocabulary Growth’ Assessment Tool**

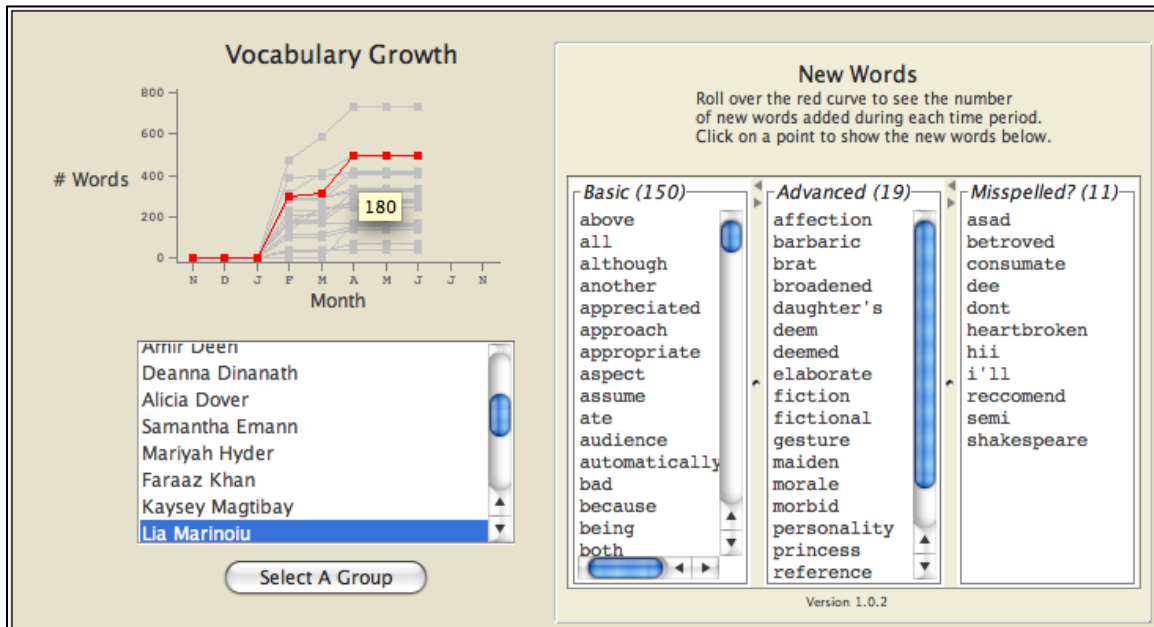


Figure 8. Knowledge Forum’s ‘Vocabulary Growth’ assessment tool, showing a grade 12 Writer’s Craft student’s vocabulary growth over time.

Here we see that a student’s (Lia Marinolu’s) vocabulary grew by 180 words between March and April. The columns on the right show what these words are, and make a distinction between ‘basic’ and ‘advanced’ vocabulary.

### *'Writing' Assessment Tool*

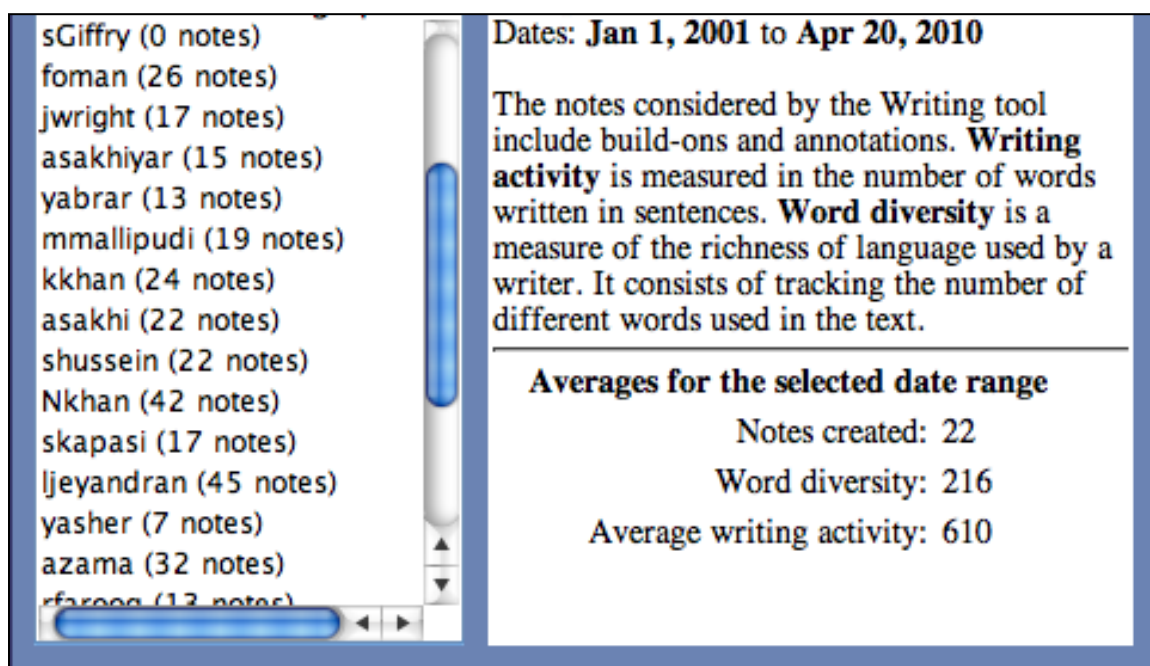


Figure 9. Knowledge Forum's 'Writing' assessment tool, showing E. Galli's grade 8 class' writing growth over a period of time.

The Writing assessment tool indicates average writing growth for a group over time. The left column indicates the number of notes contributed by each student in the group. Writing activity is measured by the number of words in a sentence. Word diversity indicates the richness of language. Clicking on a student's name from the left column yields graphical data for that particular student. In this case, we have selected the student with username 'asakhi':

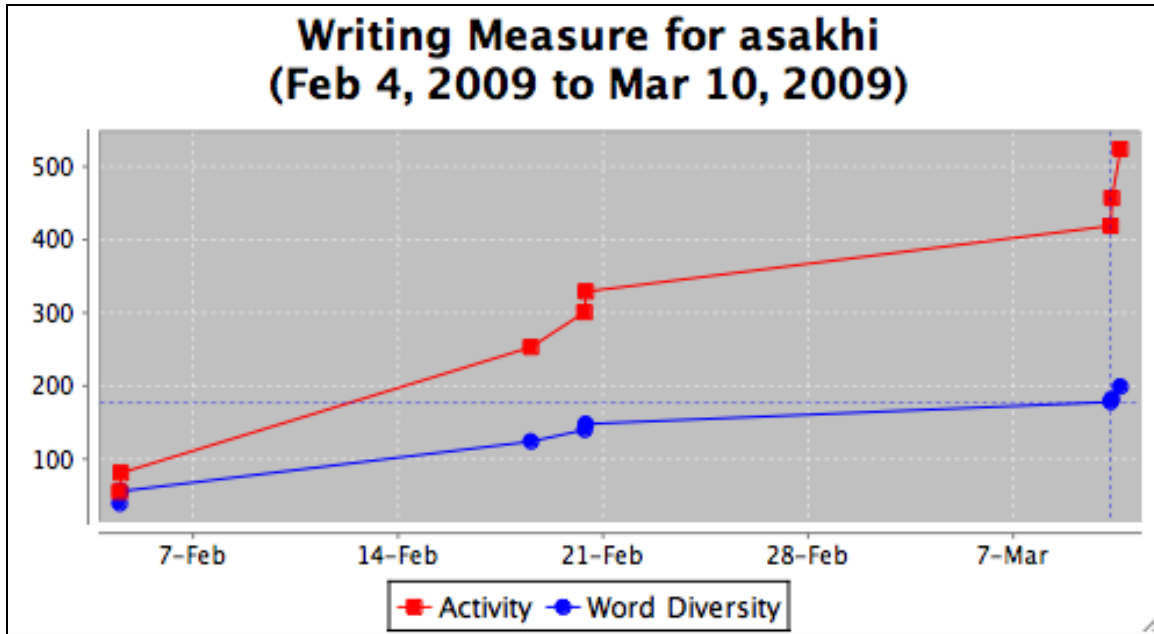


Figure 10. Writing measure for student with username 'asakhi'.

Students and teachers were excited by these tools. In subsequent reflection interviews, students of all KBCA classes repeatedly mentioned that they used these tools for self-assessment and that these tools served as motivating factors for their continual skills improvement.

At this point in the KBCA project, all classes were actively working in the Knowledge Forum spaces and teachers had created several different views in which their students were contributing. What follows are some screenshots of their progress.

## Grade 6 Class' Early KF Work

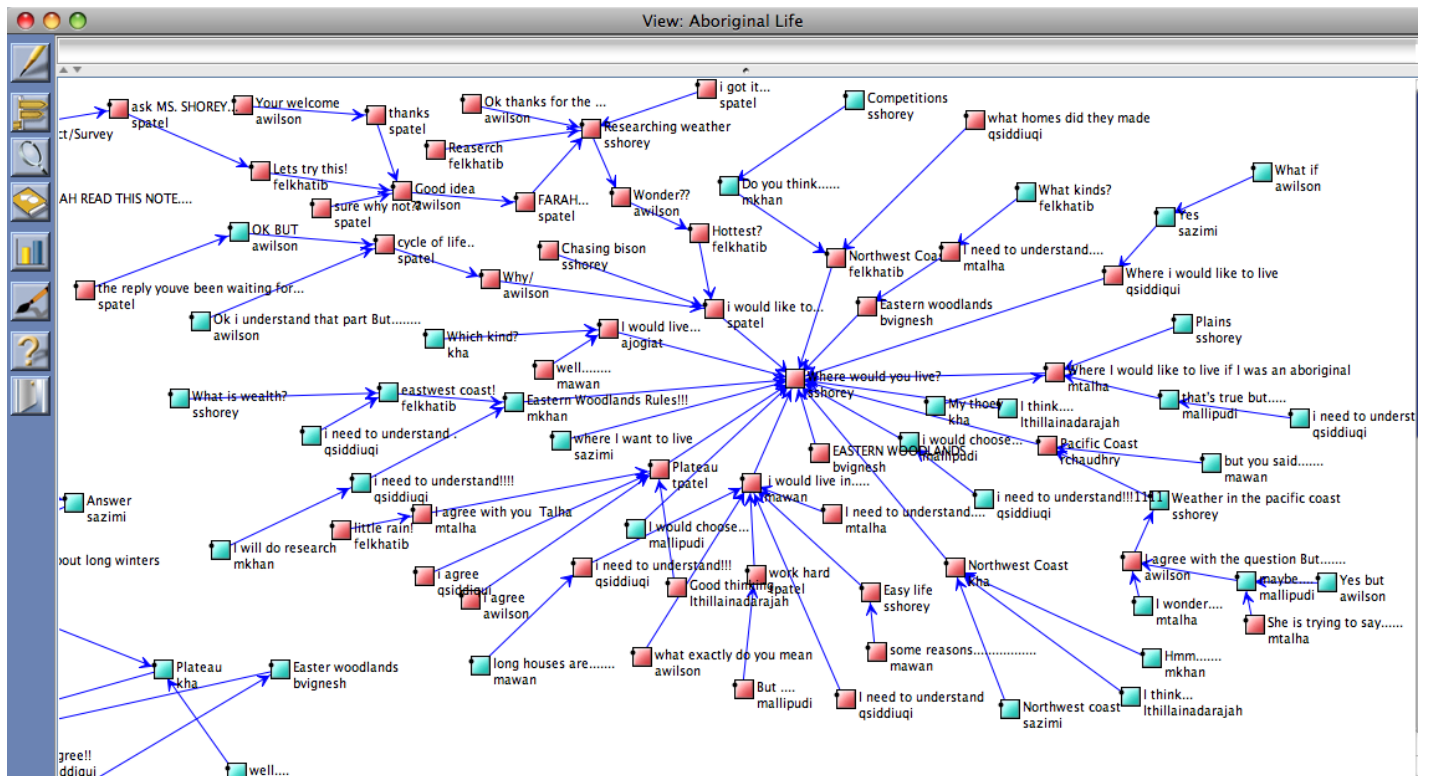


Figure 11. Grade 6's KF view, "Aboriginal Life".

Figure 12. S. Shorey's (Grade 6 teacher) initial discussion prompt, posted in the "Aboriginal Life" KF view (Fig. 11).

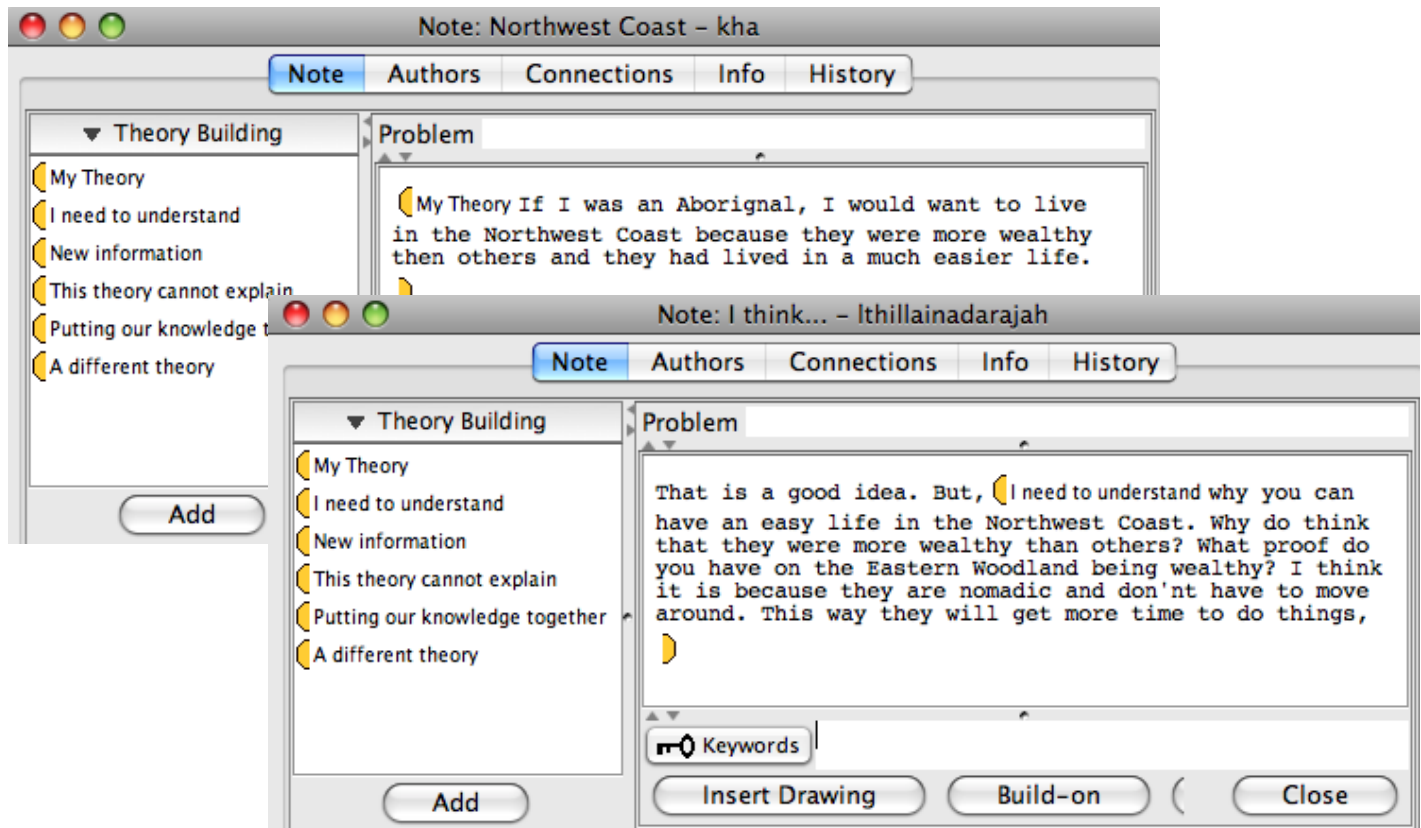


Figure 13. A short grade 6 student discussion thread in response to their teacher's initial discussion prompt (Fig. 12).

From the grade 6 student notes in figure 7, we can see that students are using the Knowledge Forum scaffolds (i.e. the yellow brackets) as prompts for their thinking. There is evidence that they are using the PQP framework in their notes and are challenging one another to go deeper with their research and with their ideas.

### *Grade 8 Class' Early KF Work*

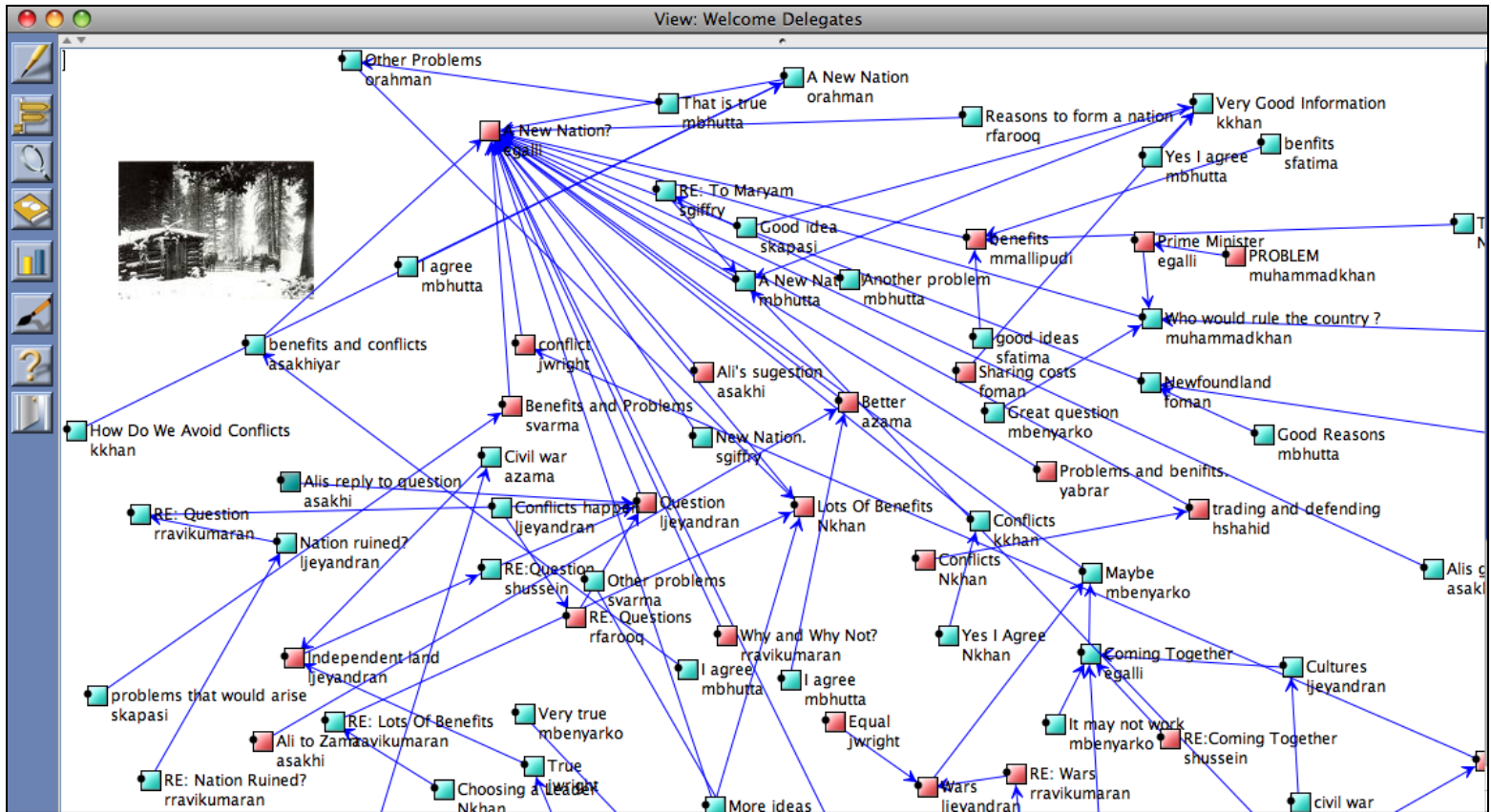


Figure 14. Grade 8's KF view, "Welcome Delegates".

Figure 15. E. Galli's (grade 8 teacher) initial discussion prompt, posted in the "Welcome Delegates" KF view (Fig. 14).



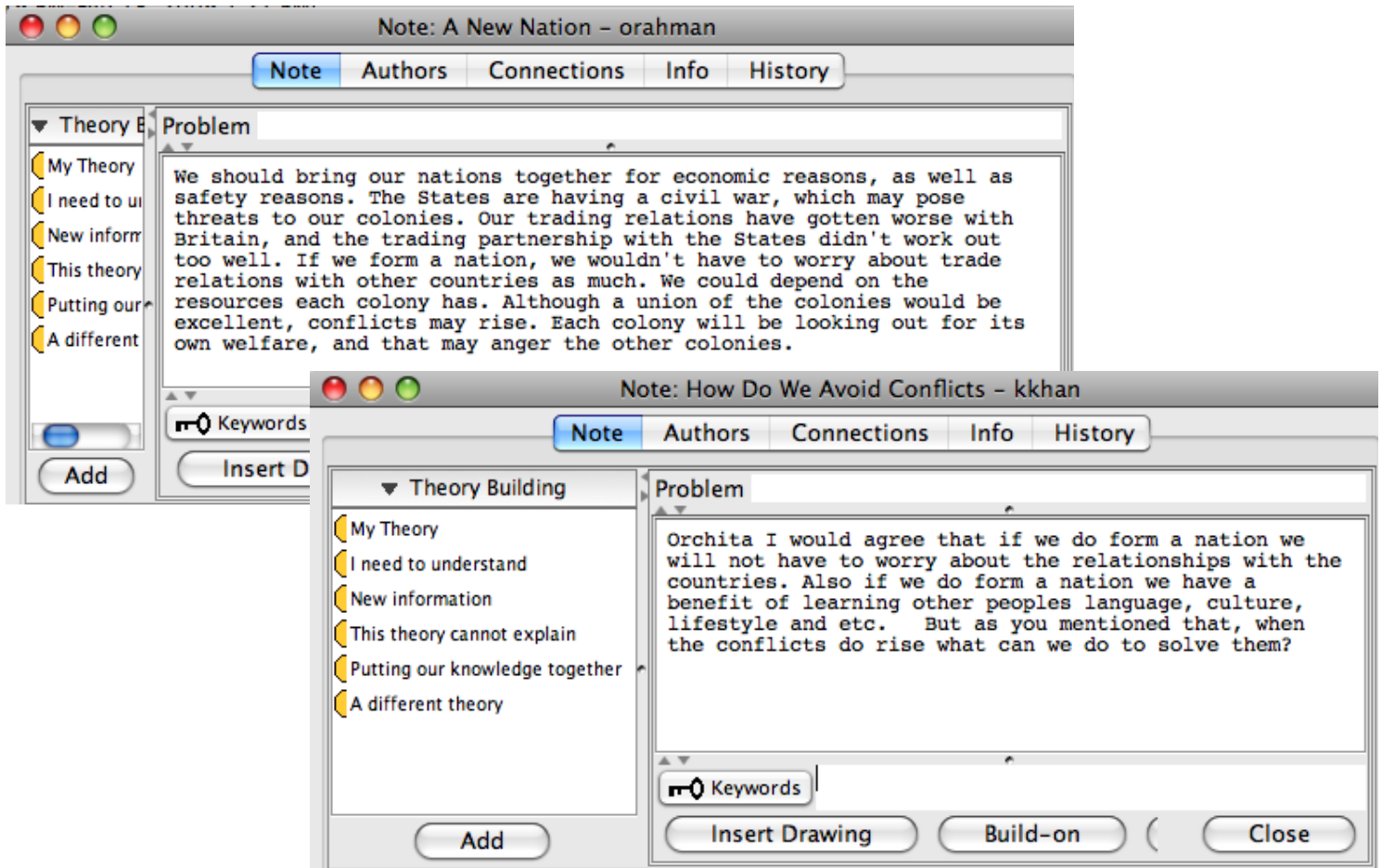


Figure 16. A short grade 8 student discussion thread in response to their teacher's initial discussion prompt (Fig. 15).

## Grade 12 Economics Class' Early KF Work

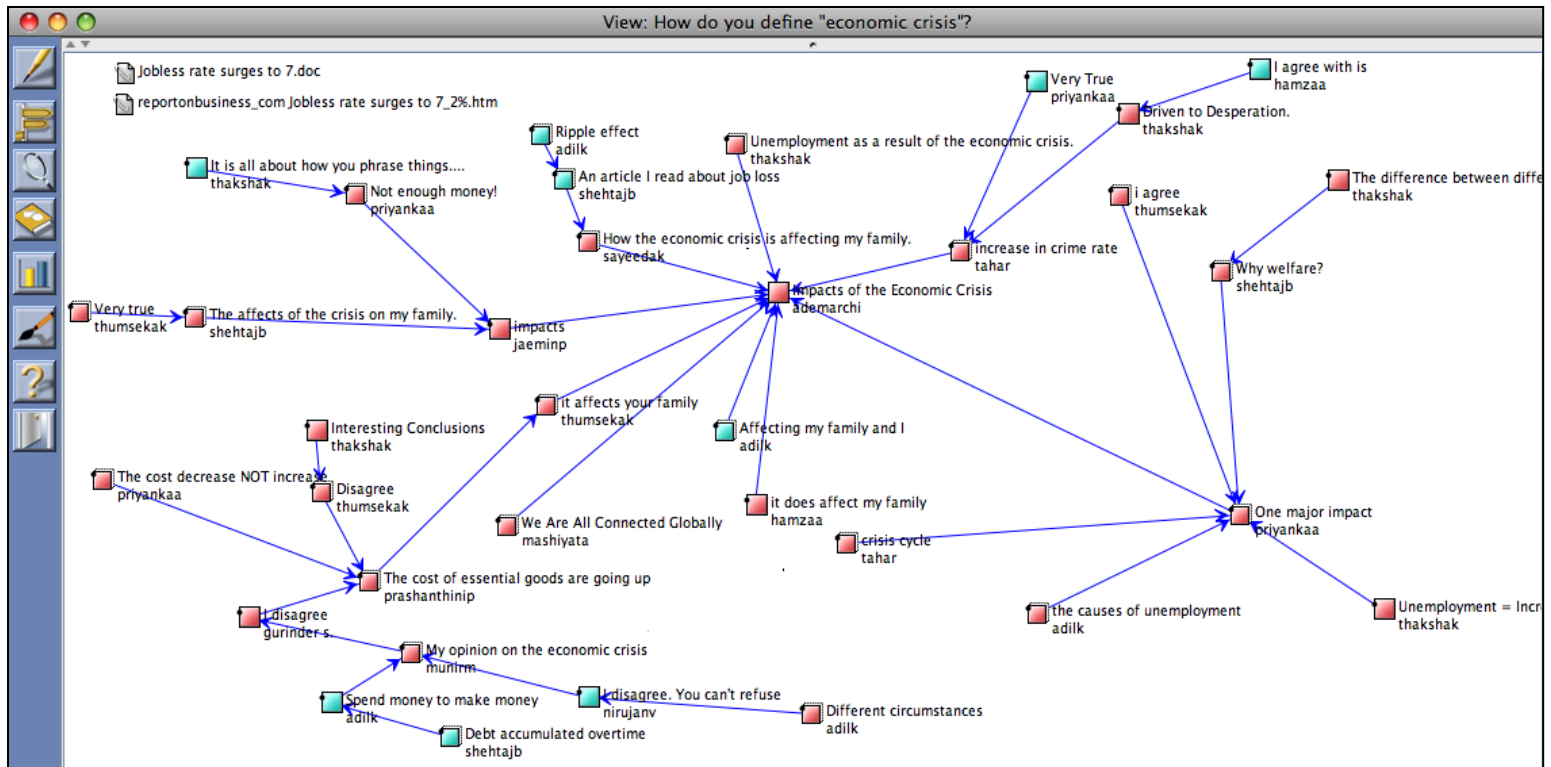
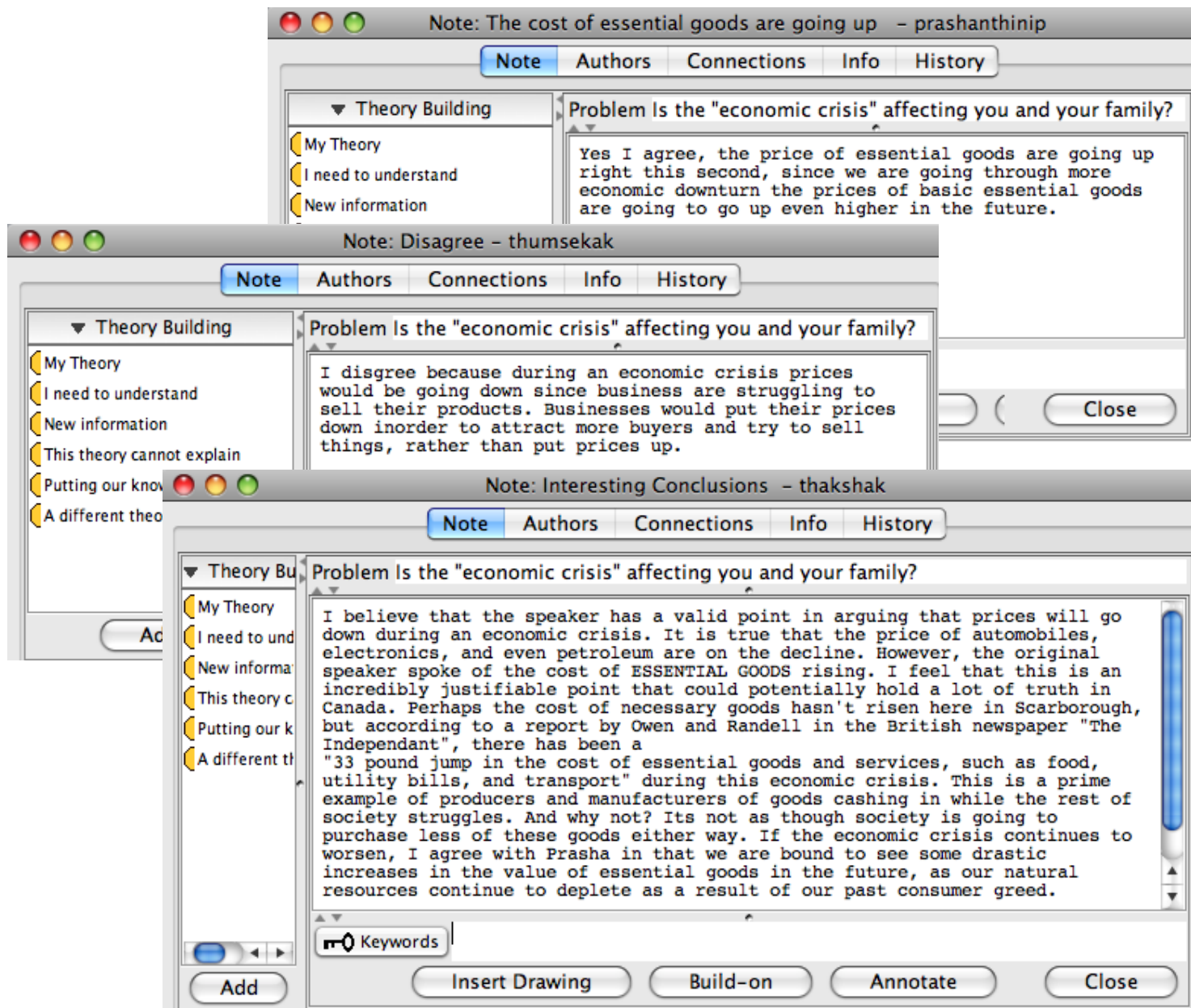


Figure 17. Grade 12 Economics class' KF view, "How do you define 'economic crisis'?". Observe in the top-left corner that the teacher has inserted an article (DOC file) and a website (HTM file) for students to read.

To initiate discussion the teacher posted a discussion prompt: "Is the 'economic crisis' affecting you and your family?" The following is a short student discussion thread in response to this.



This was the beginning of the new semester and these students were new to the course. Although the grade 12 economics teacher (A. De Marchi) had meant for this particular KF view to be an introductory economics discussion as way of allowing his students to become familiar with the new learning environment, new learning approach, and personally connecting with the new subject matter. It is evident that the students became quite deeply immersed into basic economic principles rather quickly, despite the teacher's surface-level question.

### Grade 12 Writer's Craft Class' Early KF Work

Grade 12 economics has a curriculum in which there is much content that needs to be “covered” with students. By contrast, grade 12 Writer's Craft is a skills-based curriculum in which the development of writing is emphasized rather than subject-matter content. Hence it is not surprising to see that the grade 12 Writer's Craft teacher, M. Obcena, used Knowledge Forum differently than the economics teacher. Initially, Obcena used KF as a medium for external resource sharing and later, as a writer's guild where students peer-reviewed one another's writing.

The following are screenshots of the grade 12 Writer's Craft class' “Poetry We Like” view, followed by a student discussion thread from that view. Again this was the start of a new semester and these students were new to the course.

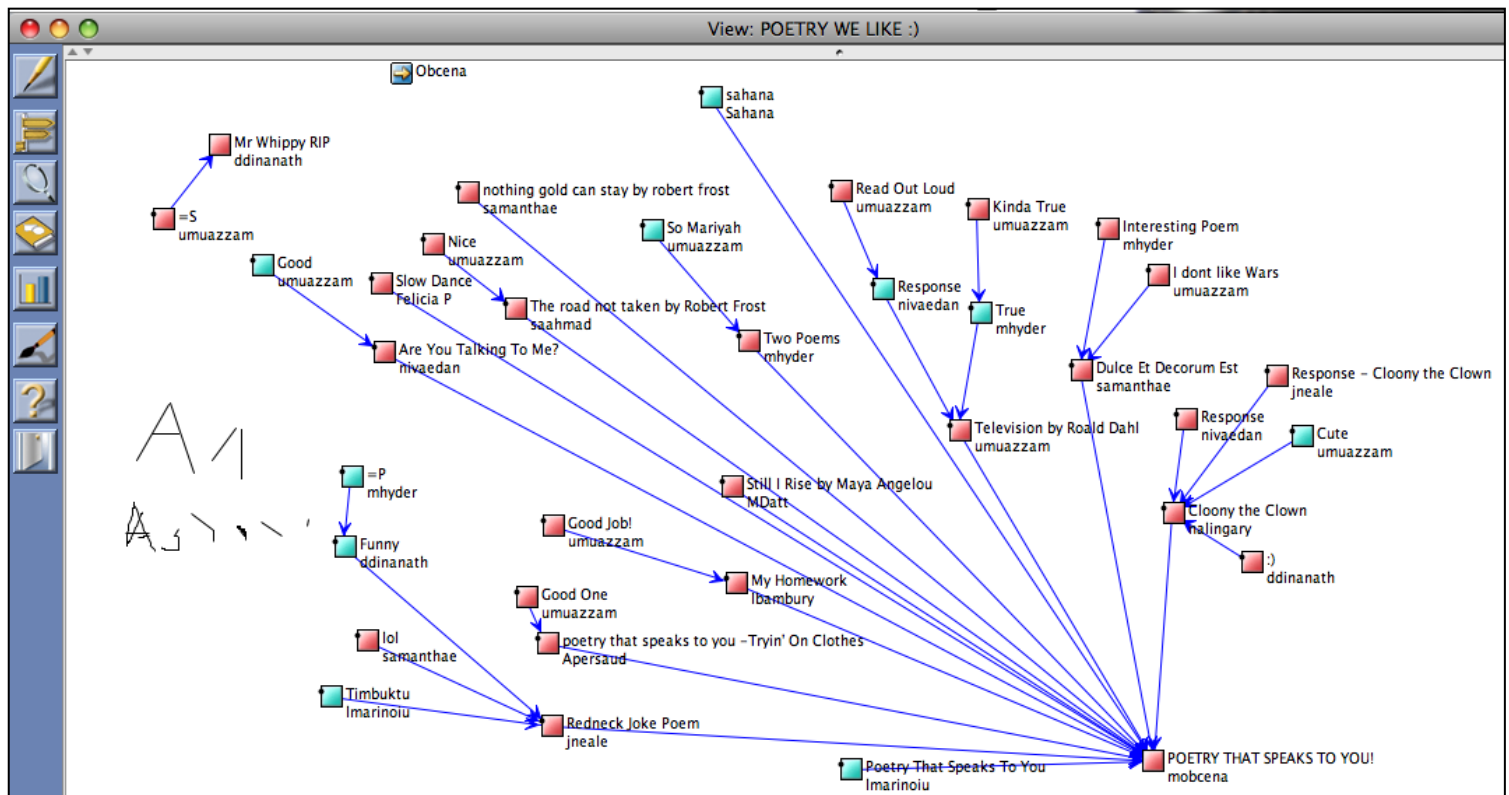


Figure 18. Grade 12 Writer's Craft class' KF view, “Poetry We Like”.

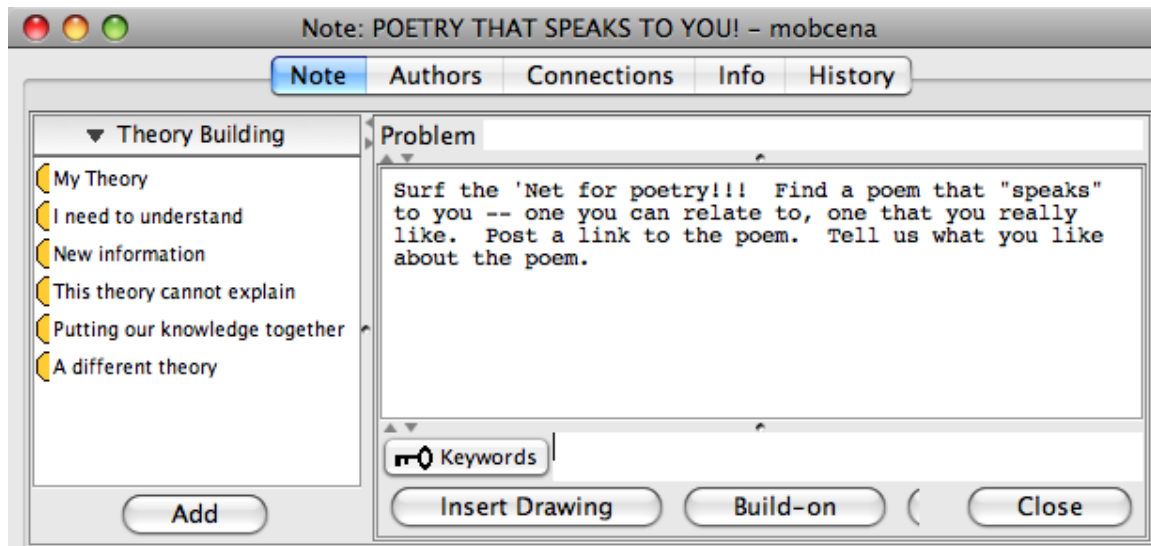
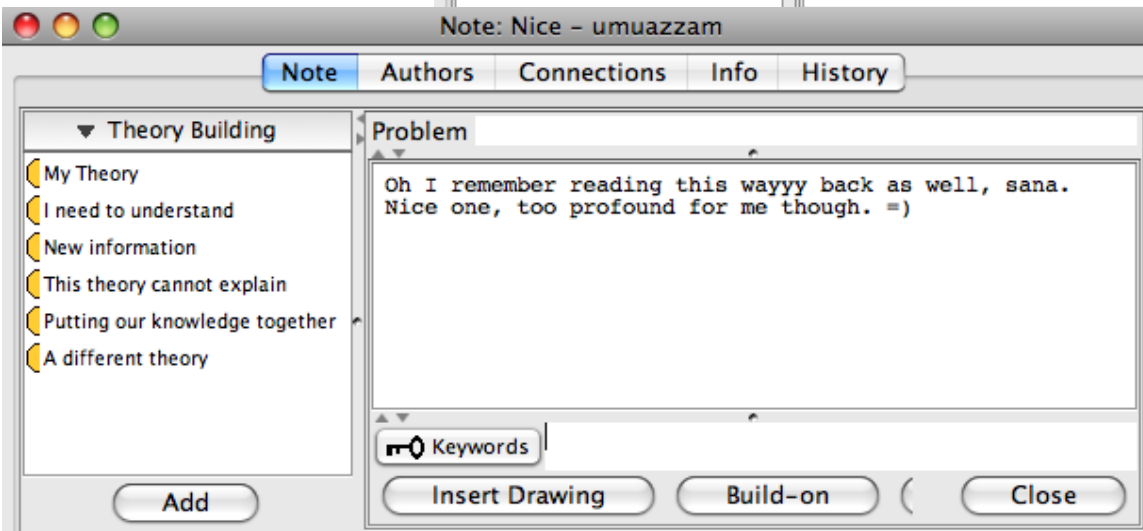
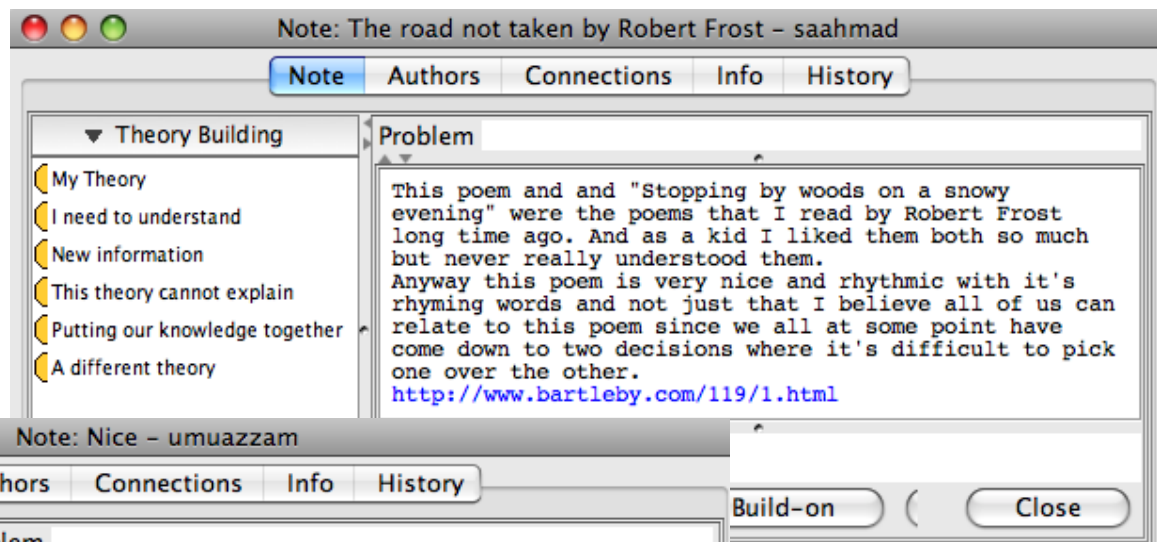


Figure 19. M. Obcena's (grade 12 Writer's Craft teacher) initial discussion prompt, posted in the "Poetry We Like" KF view (Fig. 18).



Bearing in mind that this group of students were new to the course and new to each other, this particular type of introductory asynchronous discussion activity is

a good way to promote community building among the students. Constructivist knowledge building can only occur if there is a certain amount of trust and rapport among the students and with their teacher.

#### *Phase 4.2 Teacher Reflections*

Teachers and designated students participated in their 2<sup>nd</sup> of 4 video-recorded reflection interviews in this phase of the KBCA project. The teachers described how their own teaching was progressing through their participation in the KBCA project, as well as how their students' knowledge building in the KF environment was progressing.

Face-to-face classroom discussions no longer need to end with the end of the class period. These discussions are continued online in KF, resulting in richer discussions and hence, richer learning:

Knowledge Forum is a tool that's allowing me to continue discussions on the same kind of content from the classroom to the online KF environment and vice versa. (*M. Obcena, grade 12 Writer's Craft teacher*)

The teachers were improving their questioning techniques, felt more effective at facilitating the online discussions, and were becoming more comfortable with allowing their students to direct their own learning. They observed that when students directed their own learning, it sometimes led them to inquire about topics that were deeper in scope than originally planned by the teacher:

We started with a plan of how we were going to proceed and an end task. But part of the reason I like the KF is that once they (the students) are there, they can develop their own interests and their own questions and their own ideas. Which means that we do deviate from the plan that I, the teacher, has set; because they have to develop their own ideas and I've given them that freedom. I think my own teaching has developed in the KF environment because before, I would guide their research - guide their thoughts and their learning more. Here, I give that opportunity not to be successful and I think this is the first time I've ever done that. So for instance, in the KF, students have been very interested in comparing data from the Aboriginal time period about climate and weather, to today's data about climate and weather, and to see if

there's been any change and what could have caused that change. They're looking at how the Aboriginals used the environment, how we use the environment, and how that's changed the interactions we've had. The students have really gone into exploring that, and they've actually looked at data from other countries. They've started asking, "Were there Aboriginals in those other countries and did those Aboriginals survive in the same ways the Aboriginals we've studied in Canada did?" So they've really expanded their research and I think that's progressed my own teaching. You know what? If they come up with a roadblock, they have other means! They'll figure that out on their own, I don't need to guide them to the right answer. They have their own strategies for figuring things out. I think my teaching has progressed. They're much more independent. I'm much more an observer, and I'm more comfortable with that, which is great! *(S. Shorey, grade 6 teacher)*

This gave them a sense of empowerment and it really made them take off, realizing that they are the ones directing their education, not the teacher anymore. It's like I can't give them enough! I can't give them enough questions to feed their appetite! So they've really progressed. Their skill levels have started to develop. They're starting to use the Knowledge Building Principles. They like interacting with one another as opposed to just sitting there absorbing information and getting things from a textbook, or just doing small group activities in the classroom. They can really see that they can add to the discussion, they can add to theories that they don't have to look at somebody's argument from a textbook and take it at face value and say, "These are the various viewpoints, choose one of them and believe in it". Now they can take a look at it and say, "Maybe it's not necessarily true, and here's my opinion as to why," and then back it up with credible resources that they find from the real world or from internet research. *(A. De Marchi, grade 12 Economics teacher)*

Teachers also noticed that because the students were writing for each other, they were taking more care in their writing when composing KF note postings, as evidenced by the "History" function in any KF note:

...if you look at a note's history, some of the students do that as well – they'll post a comment and another person will comment or build onto their note, they'll realize that their initial note perhaps wasn't clear or perhaps required additional information. Instead of posting a new note, they'll go back and they'll revise. *(M. Obcena, grade 12 Writer's Craft teacher)*

One teacher in particular was delighted to see that her students were more reflective in their learning. Furthermore, they were taking ownership of their own learning as well as that of their knowledge community to the point that they were assessing the validity of each other's facts in a respectful and caring way:

Their questioning techniques have greatly improved. In our classroom, we've created a bulletin board with post-it notes, so it works like Knowledge Forum – where you write down your question, or your Praise-Question-Propose theories on a post-it and then put it on the bulletin board. I think they're more reflective about their own learning. They're more interested and motivated because they know they can diverge and I'm going to be comfortable with that. They know there's not the textbook right answer. Someone will post, "I read in a book 'that'..." and the fact is wrong. At first, I would have a class discussion and ask, "Did you really read that in a book?" and going back to that strategy. But then I noticed that some of the other students were jumping into KF posting, "What book did you read 'that' from, because I never read 'that', I read 'this!'" I'd read a note posting with an incorrect fact and think, "Oh, they shouldn't post that online, that's not correct, I don't want the other students to read that..." The other students were responding with notes like, "I've never read that. I don't know if that's really true. Maybe you should read that book again, or can you bring that book and we'll talk about that more?" So it's solved that challenge for me, which has been another interesting learning experience – that the students can guide their own learning, and they can question each other, and be successful." (S. Shorey, grade 6 teacher)

#### **Phase 4.2 Student Reflections**

In their 2<sup>nd</sup> of 4 reflection interviews, students were asked how they thought their learning, reading, and writing had progressed thus far as a result of their knowledge building activity on Knowledge Forum.

Surprisingly, the students thought the absence of a spell checker on Knowledge Forum was a benefit to them, as it made them more aware of their own grammar and spelling and gave them an authentic reason to edit their notes prior to posting them to KF. Furthermore, they had to write online using formal language rather than casual MSN lingo – a new experience for all of them:



When we're using Knowledge Forum, there's no spell check on there, so we have to spell check everything ourselves, and make sure that our grammar is proper. When you're on Microsoft Word, the computer does it for you, so you kind of get lazy, but this way, we're actually learning more because we have to check it ourselves. It helps us become better writers because we're not writing like how we write on MSN, we have to actually use proper language, so it's actually helping us develop our reading and our writing skills. When we read other people's comments and we get to learn their ideas, we're actually taking in more information – like analyzing what they're saying, so that's helping us develop our reading skills too. (*Thaksha, grade 12 Economics student*)

While I've been using Knowledge Forum, I've been trying to be more coherent in the way that I give my answers, so I'm trying to develop them (my postings) so that everybody can understand it. I'm editing it more so that people don't find a lot of mistakes and they don't say, "I don't understand." I'm thinking more about my answer, whereas when I'm speaking, it's really hard to come across as clear as I can in my writing. I'm becoming clearer." (*Lakesha, grade 12 Writer's Craft student*)

Some students found the Knowledge Forum "Writing" and "Vocabulary Growth" assessment tools to be especially helpful for tracking their own skills development:

I think it really has improved my reading and writing skills, mainly because of that program that Knowledge Forum has, that evaluates your reading and writing skills. You can actually see the graph and it lets you evaluate your own progress – you can see the graph going up or down over time, and it helps you become a better writer. (*Mashiyat, grade 12 Economics student*)

The grade 6 students observed that they had always used the computer and the internet as a source of information from which they would pull their new knowledge or information. This was in contrast to their current usage of technology to access their peers' knowledge and ideas, and to share their own knowledge and ideas with their peers, "...you're teaching something and learning something back" (*Lathiha, grade 6 student*). Bavi, a shy and quiet boy, commented that he was afraid to raise his hand in class, but he enjoyed interacting with his classmates online via KF. These grade 6 students were

developing a sense of improvable ideas – one of the 12 knowledge building principles (Scardamalia, 2002), in community knowledge building:

It's kinda like you're in court. You want to make your point and they (a classmate) want to make their point, both of you could probably put your ideas together and make one point. (*Antonette, grade 6 student*)

Many students commented on how much better they were able to learn from each other, and expressed delight in being able to read contributions from students who would not normally speak up in class. They appreciated the idea diversity – a knowledge building principle (Scardamalia, 2002) - being able to build upon the ideas of their peers and to combine these with external resources which they could easily share in a KF note. All this allows the knowledge building community as a whole to learn together – what Scardamalia (2002) would call 'symmetric knowledge advance', another of her 12 knowledge building principles:

With the textbook, you just have one person's voice throughout the textbook – their ideologies, and they might be biased in what they're thinking. (*Chris, grade 12 Economics student*)

...but with Knowledge Forum, you can hear what your peers have to say and you can add your own theories, you can ask questions, and if you don't understand, you can use other sites or videos or links from other internet sources; and gather all kinds of information and learn from everyone in your class! You can't do that in class, but with Knowledge Forum, you can, so it's just great because everybody learns together. (*Mashiyat, Grade 12 Economics student*)

### **Phase 4.3: Knowledge Building Follow-Up #2**

Just over 4 weeks after starting community knowledge building in Knowledge Forum, teachers began to conclude their Knowledge Forum activities in preparation for product creation, or what the Ontario School Library Association would call the "Stage 4: Transferring Learning" (1998).

#### ***Phase 4.3 Teacher Reflections***

At the conclusion of their knowledge building work in Knowledge Forum, teachers were asked how they have grown professionally, as well as how their students have grown from the experience.

The teachers found their month-long constructivist knowledge building work and access to Knowledge Forum to be an exciting approach to teaching. They were happy to see that their students were highly engaged and demonstrated what Scardamalia calls “epistemic agency” – 1 of the 12 knowledge building principles, when learners:

...set forth their ideas and negotiate a fit between personal ideas and ideas of others, using contrasts to spark and sustain knowledge advancement rather than depending on others to chart that course for them. They deal with problems of goals, motivation, evaluation, and long-range planning that are normally left to teachers or managers.

(Scardamalia, 2002, p. 10)

It was evident that the teachers had successfully implemented a new methodology in their teaching practice, with varying success as observed by this researcher. Moving to a constructivist approach was a big epistemological shift for these teachers. What they were able to accomplish in such a short period of time, especially with respect to changing their personal conceptions of what type of teacher they were, was indeed remarkable. The KBCA teachers only had about a month to fulfill the knowledge building aspect of the project, and this researcher had not any grand expectations of deep knowledge building to occur with the students. Be that as it may, all KBCA teachers saw evidence of the benefits of using a constructivist approach among their students.

I think that the intellectual underpinnings of 'constructivist knowledge building' is unassailable: teachers and students alike are LEARNERS and there's no such thing as knowledge that's the be all and end all of any given 'truth.' I found it very enlightening listening to Cresencia Fong explain to us at the beginning of this process what 'constructivist knowledge building' was. Prior to this, I understood in an intuitive way the importance of having my students be part of the knowledge 'building' process but having it articulated in language crystallized the concept for me. Incorporating the above in my teaching practice takes place in a variety of ways already; using Knowledge Forum and/or Audacity software facilitates this through the use of technology but the principles of constructivist knowledge building can be incorporated

into teaching practice without ANY use of technology. (*D. Jaksic, Teacher-Librarian*)

The experience has epitomized the necessity to have open-ended questions. As teachers, we should be using open-ended questions regularly to encourage higher order thinking skills. With knowledge building and Knowledge Forum, if you don't have those "good questions" set up, the discussion and notes will be stifled. This experience has also validated for me, how students learn. They learn through creating, they learn through technology, and they need to be engaged. So there is room for the paper and the pencil in the classroom however, this is exciting learning. And they really, really enjoyed it! (*E. Galli, grade 8 teacher*)

I'm understanding how media is very powerful and how we can easily integrate it into the curriculum. The kids love to use it, and it's a powerful tool that engages them. It's made me aware that it's not just me teaching curriculum, that they too can also lead discussion regarding various topics. They can engage themselves, they don't always need a teacher in front of them. There's some kind of anonymity with Knowledge Forum which allows them to take more risk and it makes them feel like they're a predominant player in their learning. They're helping other people learn as opposed to being a passive person who doesn't necessarily want to express their opinion in a classroom, but is more than willing to do it in their own home behind a computer. That increases their ability to express themselves, which increases their confidence level; and that's what you want them to have. (*A. De Marchi, grade 12 Economics teacher*)

### **Phase 4.3 Student Reflections**

Student reflections about their knowledge building and Knowledge Forum experience indicated that they were excited by their learning experience, developed confidence through it, and were genuinely interested in developing deeper understanding of their topic.

We've learned how to think outside the box. We've learned from each other, we've learned from our teachers, we've expanded our learning...We're just more comfortable. (*Orchita, grade 8 student*)

...yeah, more confident! (*Sohum, grade 8 student*)

There is evidence that some students internalized Scardamalia's knowledge building principle of "embedded, concurrent and transformative assessment" as well as the principle of "improvable ideas":

When I wrote new KF notes, I took some comments that people wrote, then I checked if it's right or not, like from the library and other resources. I took those information that I got and I used those for my own learning. *(Bavi, grade 6 student)*

Another one of Scardamalia's knowledge building principles that seemed to have been internalized by some students was "community knowledge, collective responsibility":

I've grown as a learner and I've been able to accept other people's ideas easier. I have other people contrasting my ideas, so I can go back and refine my own ideas. So basically you make a statement, someone tries to refine it. Then you go back and you develop a better theory. *(Chris, grade 12 Economics student)*

When I'm writing, we have to do something called PQP. P is for 'praise', Q is for 'question' and P is for 'propose'. Once you read someone's KF note, you have to praise their idea – or some part of it, then question them about their post – like maybe you want to know something more about it, and then you have to give your opinion on it. So you're building knowledge onto each other. *(Lathiha, grade 6 student)*

The grade 12 Economics students commented about their intensely stimulating Knowledge Forum discussion regarding their chosen economic philosopher. It is evident from their KF postings and their reflections, that they developed an excitement and a deep understanding about these economic philosophies through their KF discussions and classroom knowledge building talks:

We have to choose one economic philosopher who we believe will help our economy thrive. *(Mashiyat, grade 12 Economics student)*

I decided to go with Adam Smith and capitalism. So I put my idea forward, and then they (classmates) countered me by saying that, "It's the greed". Adam Smith's philosophy is 'self-interest rules all', and that's what governs free market. So they (classmates) wrote that, "It's the greed of the bankers that caused the economic crisis." After they wrote that, I had to reframe and refine my idea by saying

that, “That’s not Adam Smith’s philosophy, that people could be greedy.” I had to defend it! (*Chris, grade 12 Economics student*)

Students commented that until now, they were accustomed to using the internet for research and information mining, and using various word processing and presentation software to produce an ‘end product’ of their learning. Using technology for peer-to-peer communication as a means of learning was a novel experience:

For us to communicate through technology – I think it’s a really good idea. It also helps us learn a new skill...I think it’s a way to get to the younger audience and the younger generation.  
(*Thaksha, grade 12 Economics student*)

From this point, the project proceeded onto Phase 5 in which the middle school students created digital comics and the secondary students created podcasts to demonstrate their learning. Since the scope of this paper is to focus on the constructivist knowledge building portion of the KBCA project, phase 5 will not be discussed. Suffice it to say that the final products were rich with subject matter understanding, and greatly enhanced by the new media format of these products. The students and teachers gained further technical skills in the use of Comic Life or Audacity software, and had fun along the way!

## Conclusion

2 middle school classes and 2 secondary classes along with 2 classroom teachers and 1 Teacher-Librarian from each school, participated in the 6-8 week classroom implementation of the Knowledge Building Culminating Activity (KBCA) project. Although it was a short project, the teachers and teacher-librarians were able to make an epistemological shift in their conception of their role as teachers – from ‘sage on the stage’ to ‘guide on the side’. In parallel, their students became active community knowledge workers and developed epistemic agency in their community and personal learning. Further opportunities to continue such teaching and learning approaches would certainly help these teachers and students to continually develop their constructivist knowledge building skills. It is our hope that these 4 teachers and 2 teacher-

librarians will continue to hone their constructivist and ICT skills, and build capacity at their respective schools by sharing their new knowledge with their school staff – thereby becoming change agents for their school community.

As previously mentioned, one does not need computer technology to do constructivist knowledge building with students, though technology does enhance the experience. Face-to-face knowledge building talks can occur in the classroom. If a more permanent record of the discussion is needed, one can mimic the Knowledge Forum discussions in the classroom by having students write their PQP postings on sticky notes and posting these to a bulletin board in the classroom. String or chalk-drawn lines can be added to indicate notes that build-on to other notes.

Furthermore, Knowledge Forum is not the only type of software that can be used for constructivist knowledge building asynchronous discussions. Any software that allows for threaded discussions can be used for this purpose. However, Knowledge Forum was specifically designed to support the pedagogy of constructivist knowledge building, hence the deliberate barrenness of the environment, the scaffolds, and other technical affordances unique to this software.

The constructivist knowledge building approach to learning is an effective way to prepare today's students to be knowledge workers for the knowledge society in which we live. It maps nicely to the OSLA's research and inquiry model as well as to the Ontario Achievement Chart. This, in conjunction with the integration of ICT as a means of facilitating knowledge building, and as a means of producing an end-product to demonstrate learning, encompasses 21<sup>st</sup> century skills development.

*May the journey continue...*

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