

# **A knowledge building journey: Reflections of New Zealand senior secondary teachers**

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## **Abstract**

This paper documents some initial reflections of eight teachers who participated in a two-year Knowledge Building project in New Zealand senior secondary classes in 2012. As a researcher-practitioner project, this project has a specific focus on how the Knowledge Building approach could be successfully integrated into the existing curriculum and implemented in the normal day-to-day classes. As a case study, teachers were interviewed three times in 2012 and a thematic analysis was undertaken to understand the issues related to the implementation process. This paper contributes to a better understanding of some of the practical issues that teachers face in using the Knowledge Building approach and *Knowledge Forum* in their senior secondary classes in New Zealand.

## **Introduction**

A two-year project was undertaken in nine New Zealand senior secondary classes (four on-site, five at a distance) in 2012-2013, with a specific focus on how the Knowledge Building community model (Scardamalia &

Berrieter, 2006) could be successfully integrated into the school curriculum. This paper documents some initial reflections of the eight participating teachers (one teacher took two classes) after they have completed the first year of the project, and its focus is on integration and implementation. It is noted that Knowledge Building research conducted in the last three decades primarily focused at the primary level (e.g., Bielaczyc & Ow, 2010; Oshima, et al., 2006; So, Seah, & Toh-Heng, 2010; Zhang, Scardamalia, Lamo, Messina, & Reeve, 2007), and it is not clear how the knowledge building approach and *Knowledge Forum* can be effectively integrated into the senior secondary school curriculum where teachers have to meet externally imposed assessment requirements. There is also a concern that Knowledge Building communities may not be effectively established in distance classes since students have limited or no face-to-face communications. This paper aims at contributing to a better understanding of some of the practical issues that teachers face in using the Knowledge Building approach and *Knowledge Forum* in their senior secondary classes.

### **Participants**

The eight participating teachers (four male, four female) came from different parts of New Zealand. While only three of them had some prior knowledge of the Knowledge Building pedagogy with two of them having used *Knowledge Forum* before joining this project, this group of teachers was very much “pre-disposed towards actually using *Knowledge Forum* and Knowledge

Building” (Teacher K). They were experienced computer users and most of them were also leaders of their schools (there were three ePrincipals and two assistant/deputy principals in the group). Two of the teachers did a postgraduate course on Knowledge Building in 2012. A researcher-practitioner community was developed in 2012 with face-to-face and video/audio-conferencing meetings held regularly to support the participating teachers.

Teachers participating in this project all aspired to improving their teaching. While all the teachers had some understanding of the constructivist and inquiry-based learning models, they were attracted to the Knowledge Building pedagogy because they wanted to shift towards a more student-centred style of teaching, as reflected by the following teachers when asked why they participated in this project:

I’m sad to say...it’s not what I want to be but the reality is, yes, I am a knowledge transmitter...it just needs to become a lot more learner centred and greater participation...devolving of control (Teacher CO).

[students are] too dependent on me to give information, to learn. I want them to be independent learners and independent of me to an extent...I am the one who’s writing all the material they’re reading (Teacher TA).

Of the nine classes in the first year of this project, four of them were on-site classes, and five were distance classes. The on-site classes were located in two main cities and a provincial town, and the distance classes were offered by the New Zealand Virtual Learning Network, with most of the students coming from rural areas. In the distance classes, students met one hour a week via video-conferencing, and they had three additional hours per week to conduct independent study. Teachers typically spent one school term (ten weeks) with their Knowledge Building classes (refer Table 1).

**Table 1: Summary of participating teachers and classes in Year 1**

<b>Subject/Class</b>	<b>Year</b>	<b>Classroom based</b>	<b>Video-conferencing</b>	<b>Number of students</b>
Biology	11		1	9
Art History	13		1	9
Economics (Class 1)	12		1	8
Economics (Class 2)	12	1		9
Economics	13	1		13
Physics	13	1		13
Accounting	12		1	16
Classics	13		1	25

English	11	1	23
<b>Total</b>		<b>4</b>	<b>5</b>
			<b>124</b>

### **Data collection**

A case study approach was used in this study. The participating teachers were interviewed individually twice in 2012, at the beginning and end of the year. In addition, a group meeting was held at the end of the year for teachers to reflect individually and as a group on the process and outcomes of their Knowledge Building classes. As a design-based project, these reflections were used to help re-design the Knowledge Building classes that teachers would teach in the second year of the project. Following Yin (2009), a thematic analysis was undertaken on the interview transcripts to understand the issues related to the implementation process, and to address the following research question:

How can a knowledge building community be designed and effectively integrated into the New Zealand senior secondary classes, both in the classroom-based and distance learning contexts? What factors will affect the roles of the teachers and what teaching strategies and design principles do teachers use to support students' advancement of knowledge?

### **Findings**

*A real pedagogical shift*

Using the Knowledge Building approach in teaching requires a huge pedagogical shift for senior secondary teachers. As expressed by Teacher M,

for me this Knowledge Building and *Knowledge Forum* is a true pedagogical approach that requires a real knowledge shift...it's actually for real. I've done things before and it's just like, ohh yeah, ho hum but...this actually causes something quite significant to shift.

Teachers in this project had difficulties in articulating how the Knowledge Building model was different from the other inquiry based learning models. For example, after a year of working with their students in Knowledge Building, when asked how they communicated the Knowledge Building pedagogy to their colleagues, one teacher responded:

[teachers] will think it's just another example of inquiry learning...so it's nothing new to them...I'll find it quite hard to explain to them that Knowledge Building is more than just inquiry learning...(Teacher CO).

It took time for teachers to develop their own understanding of the Knowledge Building model and their understanding would affect how they taught their classes. For example, for Teacher CO, his initial understanding of Knowledge Building was that "a big

part of this Knowledge Building is asking the right questions, you need to ask the right question”, so in his class, the emphasis was not so much on ideas improvement, but asking the right questions and providing the right answers. Eventually after discussing with other teachers and the researchers, his understanding of Knowledge Building has changed, and he began to ask more facilitating type of questions. Similarly, for Teacher S, Knowledge Building is not so much about developing new idea, as “knowledge building is very much the way I teach anyway. I’m about the kinds and them exploring to find the answers and working together”.

In contrast, Teacher TO put a huge emphasis on ideas improvement. In the opening note of one of his *Knowledge Forum* views, he wrote:

We are doing great so far but we can do better. We are functioning as a knowledge building community pretty well already. To further enhance our knowledge creation, we need to be thinking more about how useful our contributions are to the rest of the community.

Teachers had to spend time and efforts to understand the application of this pedagogy. For Teacher M, it has been a long journey:

I need to spend a lot of time with it before I throw it out to students...it feels like the more I learn, the

more I need to know and the shift and the changes in my thinking have been really, really interesting and quite profound, I think...a real intense investment in thinking really deeply and it is interesting.

It is the same for Teacher D,

It took quite a long time to get my head around the practical application and how was it going to work in the classroom and I certainly, right from the get-go, was really keen and understood the approach...I might say my understanding developed over time.

It is also important that teachers are conversant with *Knowledge Forum* and it takes time for teachers to know how to *Knowledge Forum* to support discourse effectively. As reflected by Teacher D:

It's one of those tools, the more you use, and the deeper you dig, the more understanding you develop...like Knowledge Building itself, I think there's still quite a bit more for me to learn. It's really just a matter of continuing to use it.

One teacher waited until the third term before she introduced *Knowledge Forum* to her class. By then she had lost the confidence of using it and she ended up not using it at all in her class.



If you're using it, it becomes really familiar and you can work out the, the tweaks of it but I waited until...halfway through term two before I started and I'd forgotten...so much and so therefore I lost my confidence... (Teacher CA)

Teachers could have a great influence of how students used *Knowledge Forum* in their classes. For example, Teacher S didn't like *Knowledge Forum*, so her students by and large didn't like it either. Teacher S confessed:

It never helps if your teacher doesn't either...I think that's always going to influence them. And I just came across as a nag...if the teacher hates (laughs), they are not going to push it with the kids.

In the first year of the project, there was not sufficient time for the teachers to use the scaffolding tools effectively, and none of them had used the rise above notes with their students. Teachers also found that it was important to provide a navigational structure for their students to move around from one view to the other, and to provide a structure for discussion, including the expectation of how often and what to contribute by the students.

### *The role of the teacher*

Similar to what has been reported in the literature (Lee, Chan, & van Aalst, 2006), teachers in this study felt that it is essential to develop a collaborative learning culture

and a safe communication environment in the class (both on-site and distance) in order to prepare their students to participate in the Knowledge Building process. One distance teacher established the following “ethos” with her students (Lai et al., 2012):

1. Safety of the participants
2. Trust of and in the community and the facilitator
3. High expectations
4. Engagement with subject matter and the community
5. Good Communication
6. Netiquette of emails, *knowledge forum*, internet and video conferencing
7. Encouragement to foster discussion therefore increasing knowledge and advancement of understanding
8. Transferrable skills
9. Regular participation

Teachers had difficulties in deciding how much they should be involved in the *Knowledge Forum* discussions. Table 2 provides a few examples of the amount of contribution of questions by teachers and students in some selected views. For Teacher CO, he just fell back to what he knew best as a teacher, and was deeply involved in asking and answering questions. In contrast, Teacher M used a more hands-free approach, supporting her students to become self-regulated learners. Other than being a distance teacher, she also used the Knowledge Building principles in her on-site class (not part of the project):

...because I'd been introducing this language about Knowledge Building...getting that student to work with that student or how about talk to them about their ideas and see what you come up with...in that first part of the year...having to step back...but quite quickly I saw the students fill that gap, whereas I hadn't seen like in other years...[they] are in a situation where they learn really effectively from each other and produce really good work out of it...because of an understanding of the Knowledge Building principles.

**Table 2: Teachers and students' contributions to question in selected views**

Class	View	Notes	Contributors	What Q (T)	Why/How Q (T)	What Q (S)	Why/How Q (S)
Teacher TO	3 <sup>rd</sup> problem	39	14	0	1	11	5
Teacher CO	Causes of econ growth	56	6	11	5	2	1
Teacher M	Best theory	32	7	0	0	3	3

Knowledge Building has created a different class dynamic. As a teacher who used to lecture in his classes, Teacher TO felt that he was redundant.

...the first time that I felt redundant in the classroom...it is quite weird...But now that's what I want, all the time, because then I can get in amongst the kids, you know.

Teacher M has changed her way to talk to her students in her distance class:

The way that I would sort of lead and prompt a discussion has changed. Like a student might start to explain an idea and then sort of second-guess themselves, I'm able to jump in and say, all of the ideas are important.

### *The tension of assessing students*

In New Zealand, there is a national curriculum and it was revised in 2007. The importance of building students' capacity as knowledge creators is emphasized in this revised curriculum (Ministry of Education, 2007) and students are encouraged to acquire the competency of becoming "competent thinkers and problem solvers, [who] actively seek, use, and create knowledge" (p. 12). So in terms of using the Knowledge Building approach in

teaching there should not be an issue, in theory, as pointed out by one of the teachers,

In term of the New Zealand curriculum, I think it has actually integrated quite nicely with those sort of key principles of the New Zealand curriculum...in terms of Classics...it has fit in really nicely (Teacher D).

However, in practice, how assessments are done may be a problem. In New Zealand, formal schooling starts at the age of 5, and there are six years of primary (Years 1-6), two years of intermediate (Years 7-8), and five years of secondary school (Years 9-13). In the last three years of secondary school (Years 11-13), students are assessed internally and externally, in preparation for entrance to tertiary institutions. The New Zealand's National Certificates of Educational Achievement (NCEA) are national qualifications for senior secondary school students introduced nationally in 2002. There are three levels in NCEA, each has its achievement standards (AS), assessed through internal and external assessments. Depending on how well students meet these standards, they will gain either achieved, merit or excellence credits. There are also scholarship examinations taken by high achieving students in a number of subjects. NCEA is administered by the New Zealand Qualifications Authority (NZQA).

These achievement standards are driving the curriculum and course content and how teachers teach in senior secondary classes. As commented by Teacher K,

assessment in senior secondary is always the elephant in the room and if you don't figure out...how can we do it differently [using the Knowledge Building approach] which actually challenges the conventional sort of formatively and summatively evaluating what's going on...

There is a tension between NCEA content and the Knowledge Building approach. The NCEA content is very prescriptive. In contrast, the Knowledge Building approach encourages students to generate and develop ideas and ask questions which may not be related directly to the curriculum. Teacher CO had some doubts of whether Knowledge Building was compatible with the curriculum.

...with the current assessment approach taken by NZQA, other than for internal assessment, I don't see us being able to use *Knowledge Forum* currently as assessment evidence...external, no; internal, yes. There's a long way to go in that the learning culture [culture of investigation] that we have at the moment that has developed with our students is not one that assist with Knowledge Building...they're so used to the transmission model...it can be quite frustrating for them because

there's no immediate answer or right and wrong as far as they're concerned...time was an issue.

Teacher M agreed with this observation:

The NCEA style of thinking...teaching is fitting, matching the exam...it's almost like here's the knowledge, memorise it whereas Knowledge Building is about what is the important knowledge? How can we learn about that? How can we work together to find out what's important? So there is a huge mismatch...Even for the excellence level, it feels like it's funneling down rather than opening up.

Knowledge Building is about developing ideas within a community, which comes into direct conflict with an examination system which measures individual achievements, as pointed out by Teacher K:

There is this quite strong tension between that individual and sort of community action and achievement...this 'answer' culture that knowledge is sort of factual rather than knowledge is something which is improvable...The Standards at Level one, are quite neat and defined, that's problematic...

In a credit gaining culture, students could see the Knowledge Building approach as a waste of time, as noted by Teacher CO,

I did have a couple of boys who refused to engaged and said it was a waste of time...this culture in secondary schooling of about getting credits...and they look at them as covering content and answering questions correctly. That's how they see how learning happens...they want to know how does this discussion ensure that I get credits in my end of year exams.

While Teacher agreed that there are constraints in using the Knowledge Building approach with NCEA assessment, teacher K was optimistic,

[NCEA] doesn't constrain the context and the direction where you're trying to prompt kids to look or go...it's more a matter of being sufficiently imaginative, I think, to actually almost spark those energetic questions or to recognize those energetic questions which will actually attract the attention of, things that actually do align with curriculum demands.

In fact, in a meeting with a NZQA assessment leader to discuss how assessments could be embedded in the Knowledge Building environment, he assured our teachers that NCEA had sufficient flexibility in both its internal and external assessments to accommodate the Knowledge Building approach.

So how was assessment being undertaken in the first



year of the project in the Knowledge Building classes? In these nine classes assessments were done in three different ways.

In Teacher TO class, his Knowledge Building class was an extension class for high achieving Year 13 physics students, with some of them intended to sit for the scholarship examination. He used a problem-based approach and students were asked to solve four problems related to curriculum content. Since students already had a good understanding of the content, they were asked to generate ideas to deepen their understanding and develop new solutions to the problems, as a preparation for external assessment. The teacher has always had an extension class with high achieving students so the Knowledge Building class was not seen as an 'add-on' to the curriculum and he was under no stress to cover new materials. No internal assessments were done during his Knowledge Building class.

All the other teachers (except one) tied their Knowledge Building classes with some external assessment standards. For example, for Teacher TA, her Knowledge Building class was a Year 11 English class and the topic of study was a Visual Text achievement standard 1.2 (external assessment) to study the film *Social Network*. In a school term (10 weeks) students had two periods a week using computers in the library to work with *Knowledge Forum*, individually and in groups. There were also two in-class periods per week where students

discussed as a class of what they have done online, clarifying ideas and developing learning techniques via movie and class based activities (Lai et al., 2012). Students were asked to write assignments to demonstrate their understanding in meeting the achievement standard, as a kind of formative assessment, and also served as a 'practice exam', in preparation for the external exam held at the end of the year.

Teacher D was the only teacher in the group who tied an NCEA internal achievement standard with the *Knowledge Forum* discussion. At the end of the project he went over all the notes contributed by the students and assessed each student individually. He found it difficult to assess in this way.

NCEA, the nature of standard base assessment made it quite difficult...being reasonably prescriptive...it's quite difficult to go thru students' work and grade it...I don't like the idea of grading what they've done because it defeats the purpose of it to some extent. So it didn't fit that well into NCEA.

He was planning to do assessment in a different way in the second year of the project. Instead of going through all the notes contributed by each student, he would grade a final product produced by the students, and it shouldn't be done as a special project, but "more

integrated with the normal day to day sort of functions of the class”.

Teacher M felt that Knowledge Building could be used more effectively with those students who were heading towards the scholarship exams because the NCEA standards seemed to fit in more with the open-ended questions that students would be getting at the scholarship level. Teacher D agreed:

When I think about external assessment for Classics, it's fairly content focused whereas Scholarship, the questions are more analytical and they're more open-ended and far broader, so that would work really well with those sorts of questions.

### *Knowledge Building in distance classes*

One unique feature of this project was that five of the nine classes were distance classes. How to provide support for students to use *Knowledge Forum* at a distance and how to develop a collaborative learning culture are two key issues for these classes. For students who have not done any VC classes before, they not only have to know how to use the VC equipment, but also *Knowledge Forum*. For Teacher CA, who had a large number of immigrant students (with 15 Year 12 students in her class, there were 14 nationalities), it was technically too challenging, so at the end she chose to

use Google doc which the students had already knew how to use as the platform for discussion.

In face-to-face classes social interactions may be taken for granted but in online classes the provision of social support and community is important. As pointed out by Teacher K, “if you haven’t got participation, you haven’t got community and you can’t do Knowledge Building”. However, it seems that *Knowledge Forum* is not a good software to support the social aspect of communication. As commented by this teacher,

When I think of situations where I’ve been in genuine Knowledge Building, they’ve always been a social community of “Hey look, we’re in this together”...but the technology [*Knowledge Forum*] itself doesn’t seem to support that very well...I notice certainly [Teacher M] has had a Facebook sort of page going there.

Without having a community in distance classes, Knowledge Building is not possible.

I started the official module...they did a Ghandi on me, the passive resistance came out, and they just refused to participant, they’d come to the VC, we’d have the discussion...I had to respect their agency, I guess...they don’t like it, in an online environment, you’ve got a bigger challenge...two loners and they were desperate to engage...put notes out and then nothing came back... (Teacher K)

In distance classes, we understand that while sometimes extra efforts have to be put in providing technical support and developing a community, it is by no means that it can not be done, and in fact, there may be some positive factors in using *Knowledge Forum* in distance classes as distance students tend to be more conversant with the use of technologies to support learning.

### *Infrastructural and technical issues*

A multiple-site license was purchased for the project and a central server was used to host the Knowledge Building databases. Except for one class, students found it difficult to access the enhanced version of *Knowledge Forum* both from school and at home. Most students thus had to settle with the basic version which they didn't like.

[students] just found that the website [the basic mode] was very 1980...They're far used to something that looks flasher and so I think the dislike for it was more aesthetic than it was practical...it wasn't intuitive to start with...they've had to learn and I find that sometimes when it comes to using online tools, they prefer something that's relatively intuitive...(Teacher TA)

Even for the enhanced version where Teacher TO's students could access in school, they didn't like it:

In terms of the pedagogy, it's brilliant but the tool, *Knowledge Forum* tool is a bit of a dog, to be honest. It's great what it does but it's not that easy sort of get the kids on to it and I think it's just really a function of it being quite old...and it's just all these extra bits and pieces that have to be in place...

Three teachers complained that *Knowledge Forum* was not used much in their Knowledge Building classes primarily due to problems of accessibility.

### **Discussion and conclusion**

The first year of the project was a learning journey for the teachers and the researchers. It has taken teachers a long time to understand the theory and practice of Knowledge Building but it was definitely a worthwhile experience. Teacher M's summarises it well (Lai, et al., 2012):

Investigating Knowledge Building this year has been very timely. It allowed me to reflect on and reframe my own role as an educator and classroom teacher. Moving to the Knowledge Building paradigm has enabled me to begin restructuring my role as a teacher, which should allow me to work in a much more sustainable and effective way for the foreseeable future, as well as enabling students greater control and understanding of their own learning. I am inspired by the power of Knowledge Building to reveal and destabilise outmoded and

ineffective educational practices and structures. For me, it is a truly future-focused, twenty-first century pedagogy.

Teachers also came to an understanding that using the Knowledge Building approach really couldn't be a one-off event, as suggested by Teacher K:

It isn't something we switch on...that you don't turn it off, on for a topic and then off for a topic...you are building a whole course...you're establishing a way of doing which is fundamentally very different and therefore to actually switch on a class and run it on a fairly conventional way and then sort of say, okay, then we're into Knowledge Building. Like it was always artificial...

Teachers were committed to spend more time with the students in using the Knowledge Building approach in the second year of the project. With the seven classes that are continuing in 2013, all except one have started their Knowledge Building projects in the first term, and they will run through the whole year, so that students can develop the "habits of mind" (Teacher CO) of Knowledge Building. The issues of how to better integrate assessments into a Knowledge Building environment will be a key focus in the second year of the project.

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