PRINCIPLE-BASED IMPLEMENTATION OF KNOWLEDGE BUILDING COMMUNITIES

by

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy
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This thesis investigates issues and challenges surrounding the use of teacher study groups as a means of addressing the gap that must be closed between design principles and classroom practices in order to effectively implement an educational innovation. A multiple-case design was used to examine how teachers’ perceived understanding of the Knowledge Building Communities principles changed over time and affected their implementation of the Knowledge Building Communities model—a model that requires student engagement in the collaborative production of ideas that are continually improved by all participants. Knowledge Forum® is an on-line environment designed to support Knowledge Building. Data sources for this study include teacher interviews, transcripts of study group meetings, teachers’ ratings of their perceived understanding of Knowledge Building principles, teacher and student activity in Knowledge Forum, and student interviews. In total this study involved seven teachers and eleven study group meetings across three school sites. Based on work at a site already engaged in Knowledge Building a tentative proposition was developed: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. This proposition was tested and refined at two additional elementary public schools. Taken together the findings suggest the importance of and difficulties surrounding study groups focused on principle-based approaches to pedagogical change. In particular, the findings point to discussion and active engagement with the principles as a catalyst for change. A data analysis technique was developed to examine the discourse
patterns of select episodes of study group meetings. The resulting pattern suggests the principles can frame a study groups’ work and set the groundwork for change through discussion of goals underlying the principles, stories relevant to their implementation, and commitment to ongoing experimentation to address obstacles. Detailed accounts of teacher difficulties and change form the basis of a descriptive model developed to convey how teachers address contextual concerns in their study groups, with elaboration of the types of interactions that help them move to deeper understanding of principles and to more successful implementations of the Knowledge Building Communities model.
ACKNOWLEDGEMENTS

First and foremost I would like to thank my family for their unflagging support throughout my graduate school years. Thanks go out to my older son Matthew who knowingly gave up his laboratory school tuition so I could return to graduate school. I will always remember those initial walks up the street with him saying, “So let me get this straight... I have to go to this new (public) school so you can go back to school?” To my younger son Luc, who was born in the year I began my Ph.D. studies, thank you for putting up with fewer play times, and yes, we can play more now. To my mother and father for their unconditional support and for the hundreds of prayer candles that they lit on my behalf, yes, you can stop now, it’s done. Finally, to my wife Hélène for her love and support throughout this at times arduous process. Simply put, I couldn’t have done it without you.

Next I would like to thank my committee, or more precisely, my committees, for the care and concern they expressed about the topic of my thesis and for the many contributions they made to its completion. To Earl Woodruff for his initial statements about the implementation of the Knowledge Building Communities model being something that needed to be examined. To Howard Russell (†) for instilling in me a deep interest in the educational philosophy of John Dewey such that I could leverage it in the completion of my thesis. Thanks Clare Brett for your persistent encouragement, especially in the dark moments, towards the completion of my thesis. Thanks also to Carol Rolheiser for joining the committee and for your exceptional skill at editing and refining my numerous drafts. Thanks Jim Hewitt for agreeing to join the committee after Howard’s death, your influence on the direction of my thesis clearly moved it in important ways for which I am grateful. Finally, to my supervisor Marlene Scardamalia, for the patience and care
you took with my work and for providing such an important educational approach for me to base my research on, I can only hope I have done it justice.

In addition to my family and committee members there are people who may or may not be aware they had an influence on the successful completion of my thesis. Thanks goes out to my friend Chris Teplovs for his constant support and for his willingness to personally deliver the final few drafts of my thesis to my committee members. To the children and especially to the teachers who participated in my study, clearly I couldn’t have done this without your participation. The impressive level of openness displayed by these teachers is the only reason my thesis has any chance of making an impact on the field. Finally, a special thank you goes out to the staff and faculty members at my current place of employment the Faculty of Education at Queen’s University and to the teachers, children, staff and parents of the Mabin School, the school I worked at part-time when I started writing up my study. I am grateful for the time I was given to work on my thesis and for the enthusiastic support that was expressed towards the completion of my graduate school program.
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CHAPTER 1: INTRODUCTION

Rationale for this study

Spillane, Reiser & Reimer, 2002, suggest that the failure of school reforms is often placed on the school principal, ineffective incentive systems or--most commonly--the unwillingness of the teachers themselves to adapt. However, there is a growing body of literature that suggests that the teacher is critical to the success of the implementation and a major stumbling block is not understanding what the innovation requires (Ibid; see also Judson, 2006). The perspective that is taken here is that sense making about a new innovation, in this case the Knowledge Building Communities model (Scardamalia, 2002), requires teachers to reconstruct their ideas about teaching in light of the new reform. The study to be reported addresses what is considered one of the most difficult problems for educational reform, “the implementation gap” (Supovitz & Weinbaum, 2008). The study explores how this gap can be closed through study groups (Hughes & Ooms, 2004; Lewis, 2000) focused on core principles underlying a reform initiative.

Implementations can stray so far from intended goals that the implementation is no longer recognizable to its developers (Ruiz-Primo, 2006; Supovitz & Weinbaum, 2008). Ann Brown referred to these deviations as, “lethal mutations” (Brown, 1992) to the intended design. Other researchers have referred to this issue as the, “degree of deviation” (Ruiz-Primo, 2006, p. 5) that is allowable, beyond which the implementation will no longer achieve its intended goals. To address the issue of deviation, Kubitskey and Fishman (2006) have developed a professional development model that focuses on supporting teacher planning between the written curriculum and the enacted curriculum to improve the fidelity of the implementation (Ruiz-Primo, 2006). However, other researchers have focused on the degree to which deviations can be expected
given the “primacy of (the) classroom culture” (Squire, MaKinster, Barnett, Luehmann, & Barab, 2003; also see Barab, & Luehmann, 2003). These researchers have suggested that deviation should be an anticipated outcome of any implementation. Still other researchers have suggested that one means of increasing the fidelity of the implementation would to include teachers in the design and development of new curricular approaches (Bannan-Ritland, Baek, Peters, Martinez, Qutub, & Xia, 2006).

Spillane, Reiser & Reimer (2002) have grounded the debate about the implementation of reforms in an extensive review of the literature, arguing that conventional theories that suggest teachers are saboteurs of new reforms are not in touch with the reality of the, “complexity of human sense-making” (p. 391). To capture the complexity of educational implementation Spillane and his colleagues built an integrated framework that included, “the individual implementing agent, the situation in which the sense-making occurs, and the policy signal” (Ibid). As it relates to this study, these factors are dealt with under the following terms used throughout this thesis: the individual implementing agent = teachers; the situation in which the sense making occurs = study group, and the policy signal = the Knowledge Building Communities model, elaborated below (Ibid).

Spillane and his colleagues conveyed their framework as cognitive in nature but they also offered a compelling argument for a combined cognitive, situated perspective. They suggested that a “situative” stance would yield important insights into the complexities of implementation (p.412). “We believe that adopting and adapting conceptual tools from work in situated and distributed cognition to frame implementation research is likely to contribute to investigations that yield important new insights into the implementation process” (Ibid). Therefore a central goal of this study is to document the sense making done by individual teachers as they attempt to
implement the Knowledge Building Communities model in their local context. This goal is addressed through embedded case studies of individual teacher change within each of the public school study groups.

This study examines principle-based implementation of the Knowledge Building Communities model (Scardamalia, 2002). In a series of case studies, groups composed of local teachers and a university researcher met regularly to discuss the implementation of the Knowledge Building model, with discussions focused on understanding the principles underlying the model and implementation in their particular classroom contexts.

The Knowledge Building Communities model that was to be implemented was based on the set of twelve principles published in 2002 (see Scardamalia, 2002 and Appendix A). Recent literature suggests that deviations from intended designs for a reform are more often the rule than the exception (Supovitz & Weinbaum, 2008, p.7). However, customization, especially during the initial phases of implementation, is considered prudent and necessary if innovative new ways of teaching and learning are to find traction in mainstream classrooms (Baumgartner, 2004; Bell et al, 2004). This research therefore seeks to document the manner in which teachers approach the principles of the Knowledge Building Communities model and how they are instantiated in their classrooms. This includes both new implementations and situations where the teachers are attempting to improve their Knowledge Building practices.

In the following sections implementation literature is reviewed for various reform initiatives, including research on the implementation of the Knowledge Building Communities model itself. This literature review pays close attention to the role context plays in implementation, teacher knowledge, teacher professional development and socio-emergent
perspectives on sense making in study groups. This chapter then ends with a brief overview of the thesis research and questions to be addressed.

Literature Review

Innovations in the Learning Sciences

In many learning sciences laboratories (Sawyer, 2006b) researchers endeavor to communicate their innovations via a set of first principles that are intended to convey core ideas recognizable in a successful instantiation of the approach (Baumgartner & Bell, 2002; Brown & Campione, 1996; Linn & Hsi, 2000; Scardamalia, 2002). But how teachers come to understand these new reform-oriented approaches, in relationship to their current teaching practices and especially in their local contexts (e.g. students, curriculum and existing technology), is clearly an area of inquiry in need of research (Supovitz & Weinbaum, 2008). Many of the learning sciences approaches, including the Knowledge Building Communities model, have a significant technology component that further complicates the implementation issue. The following review examines implementation literature with emphasis on technology-supported reforms. Particular attention is paid to the role contextual factors play in the implementation and to innovative approaches as they have been put into practice.

Yong Zhoa and his colleagues at Michigan State University studied the implementation of a set of 100 innovation projects that were funded through the State (Zhao et al, 2002, p. 512). They found 11 factors that they reduced to three central factors: The Innovator, The Innovation, and The Context. Zhoa and his colleagues developed matrices to illustrate how the distance and dependence of the innovation from the local culture, previous practices and existing technology influenced the outcomes for the implementation of the innovation. Those innovations close to the
culture of the school and not dependent on hard-to-acquire technology, stood a better chance of success than those more distant and dependent on hard-to-acquire technology (Ibid).

Ron Owston in his evaluation of the sustainability of international technology-related innovations, found that the contextual factors of teacher support for the innovation, perceiving positive results for students, teacher professional development and principal support were, “essential contextual conditions for sustained implementation” (Owston, 2007). Although other factors were identified as being supportive of sustainability, Owston stressed in his report that it was these factors, and in particular teacher professional development support and perceived positive student results, that were essential if an innovation was to continue beyond the initial implementation phase (Ibid). It is argued here that these two factors stem from the same source, the teachers’ understanding of the innovation in question and whether it is yielding the desired results for the students. However teachers may not know success when they are looking at it. The next section provides a picture of what Knowledge Building, according to its developers, should look like in practice—both the pedagogical and technological components. Therefore the following section outlines the Knowledge Building Communities model and the Knowledge Forum software designed to support its implementation.

Knowledge Building

Scardamalia and Bereiter have drawn a distinction between learning and Knowledge Building (1999). Scardamalia and Bereiter describe the classroom community as developing in the following way, “…the classroom community works to produce knowledge- a collective product and not merely a summary report of what is in individual minds or a collection of outputs from group work.” (Scardamalia & Bereiter, 1996, p. 254). For Scardamalia and Bereiter the class that adopts the Knowledge Building Communities model must make a shift from
activities aimed at individual learning to construction of collective knowledge as the central purpose (Scardamalia & Bereiter, 1999). Teachers who want to follow the Knowledge Building Communities model in their classrooms sometimes have difficulty with the learning and Knowledge Building distinction and the idea of viewing their class as a Knowledge Building Community that is to be jointly engaged in the social practice of Knowledge Building (Scardamalia & Bereiter, 1999, p. 278).

The other important distinction relates to the nature of what knowledge is. In terms of the Knowledge Building Communities model, knowledge is something that can be objectified--“discussed, tested, taught, applied, evaluated, and credited with causal force” (Scardamalia & Bereiter, 1996, p. 254). Ideas are improvable. Knowledge Building classrooms are thus likened to scientific research teams where new knowledge gets fed back into the research cycle on an ongoing basis (Scardamalia & Bereiter, 1996, p. 255). How these improvable knowledge objects are handled by the knowledge builders varies, but one important element in this knowledge objectification is the use of the collaborative computer environment called Knowledge Forum® (Scardamalia, 2002).

*Knowledge Forum*

In addition to requiring substantial changes to existing classroom processes the Knowledge Building Communities model benefits from use of technology to support new Knowledge Building practices. Knowledge Forum (Scardamalia, 2002) technology was built specifically for this purpose and was used in the present context. The school contexts for this work all included teacher and student engagement in Knowledge Building Communities and assessment of the early effects and analysis of teacher’s understanding of and facility with the Knowledge Building Communities model, including use of the Knowledge Forum software.
Knowledge Forum is used to objectify the ideas of class members so their theories and information can become objects of discourse in the construction of collective knowledge. In addition classes also develop, “social processes aimed at improving these (knowledge) objects” (Scardamalia and Bereiter, 1996, p. 254). Knowledge Forum is a network system providing across-the-curriculum support for collaborative inquiry. At the center of the software is a communal database, created by students and their teachers to facilitate discussion and the development of ideas. Students enter their ideas into the database on whatever topic the class is studying. This database is open to the whole class, so that others can retrieve the notes that have been entered, and everyone can see what everyone else is working on and what progress they’re making. Tools within the system allow students to build on the ideas that they find from other students in the database, add information that they have found from external sources, raise issues that need to be explored further, and comment on and summarize the work that they have done. Knowledge Forum provides the organization for any number of small groups to carry on discussions and debates among themselves and with each other. Students can join in the discussions of whichever group they’re interested in working with and they can re-align themselves with other groups as the need arises. Knowledge Forum also allows the teacher as well as interested others to monitor and contribute to the developing lines of inquiry of each of the groups. The computer system thus provides the organization and support for the complex array of individual and group discussions and the development of ideas of value to the Knowledge Building community itself (Scardamalia, 2002). This innovation represents a dramatic shift from a focus on tasks and activities to a focus on the development of ideas at the center of classroom knowledge work, with support for community discourse (Scardamalia & Bereiter, 1999). Some teachers have expressed dismay at the Knowledge Building principles
when they first attempt to implement them (see Messina, 2001; Moreau, 2001; Reeve 2001). In the following section a brief overview is presented to convey how principle-based innovations have been introduced and what support structures have been used to facilitate uptake.

**Specification of educational innovations**

Ann Brown, Joe Campione, Marlene Scardamalia and Carl Bereiter have all written about their respective educational innovations in terms of the central principles that define them (Brown, 1992; Brown & Campione 1994, 1996; Scardamalia, 1999). Brown and Campione stated:

> We need to specify Fostering a Community of Learners in sufficient detail to communicate its essential features to: (a) ourselves, so we can refine the design of the environment; (b) our colleagues, so they can elaborate, help clarify, and criticize our views; and (c) teachers and administrators, (so) they can put the program into place in their classrooms, schools, and districts. It is for these reasons that we have been concerned with the development of a set of first principles of learning to guide research and practice. (Brown and Campione, 1996, p. 291)

Brown and Campione went on to say:

> Without adherence to first principles, surface procedures tend to be adopted, adapted, and ritualized in such a way that they cease to serve the “thinking” function they were originally designed to foster. This proceduralization of surface activities has been the fate of many innovations, notably cooperative learning. (Brown and Campione, 1996, p. 291)

Scardamalia and Bereiter have sought to define their educational innovation, the Knowledge Building Communities model, in terms of twelve defining ideas or core determinants (see Scardamalia, 2000, 2002; see also Appendix A). But for both the Fostering a Community of Learners approach and the Knowledge Building Communities model the underlying principles are difficult to understand when they are presented outside of the classroom context in which they were developed. How best to represent these principles is an ongoing issue. Without an understanding of the underlying principles, especially as they relate to the systematic whole they were intended to support, teachers tend to modify the surface elements of the approach to the
point that a lethal mutation of the innovation is most likely to take place (Brown & Campione, 1996, p. 292). What is apparently needed is a way for the development work related to these new ways of teaching and learning to have connection to, “the blooming, buzzing confusion” of classrooms (Brown, 1992, p. 2). What is needed then is a way to bring the specifications of these new educational innovations together with the contexts practitioners are working in such that the contextual constraints can be discussed and customizations can be made that do not alter the core elements of the innovation. What follows is a review of recent research related to the implementation of the Knowledge Building Communities model in elementary school settings. A key concern is the extent to which the core principles of the approach were considered during the development of the respective Knowledge Building communities.

*Research on the Knowledge Building Communities model*

There have been many studies of the Knowledge Building Communities model and its supporting software (Scardamalia, 2002). These have included studies of the implementation and functioning of the Knowledge Building in Healthcare (Russell & Perris, 2003), Higher Education (Gilbert & Driscoll, 2002; Lax et al, 2004), Teacher Education (Brett, 2002; Ferry et al, 2000), and Elementary Education (Oshima, 2003; Hewitt, 1996). The research related to elementary school children tends toward examination of the conceptual change that is possible when children work this way in their classrooms (Caswell & Bielaczyc, 2001). The current review focuses on research that has been done on the implementation of the Knowledge Building Communities model in elementary schools and that have placed a focus on the implementation of the Knowledge Building principles. These include, Jim Hewitt’s four-year mixed methods study of an elementary school teacher’s movement towards a Knowledge Building Community (1996), Richard Messina’s three-year self-study of his transition to operating his classroom as a
Knowledge Building Community (2003), and Jun Oshima’s two-year design study of the changes that were made to a typical Japanese elementary science lesson format (2003) to bring it in line with the Knowledge Building Communities model. In all three of these studies Knowledge Forum was used to support the creation of the Knowledge Building Community.

Jim Hewitt’s study placed the researcher in close collaboration with a local teacher over a four-year period as the teacher attempted to create a Knowledge Building Community in his classroom. Key features of this study included: a focus on the (then) nine specifications (principles) for creating a Knowledge Building community, the creation of research measures to address specific questions related to the theory, iterative design changes to the software and the classroom practices, and the gathering of descriptive data such that a retrospective analysis could be undertaken at the end of the period of collaboration (Hewitt, 1996; Hewitt & Scardamalia, 2001). Hewitt used multiple measures to paint a picture of whether Knowledge Building was occurring (Hewitt, 1996). These measures were used both for formative and summative purposes to help determine if there had been movement towards the Knowledge Building Communities concept (Ibid). The measures and software were constructed in an iterative manner with a concern for whether the Knowledge Building Communities model was being approximated and what classroom design features were influencing any of the shifts that were occurring (Ibid). Hewitt found a progression over the four-year period involving the use of the software environment by the students in combination with teacher encouragement of higher levels of theorizing by the students leading to progressively higher levels of Knowledge Building (Ibid).

The study by Richard Messina and his colleagues (2003) had Messina meeting regularly with his fellow teachers to help them create a Knowledge Building Communities in their classrooms. In collaboration with a university researcher Messina engaged in iteratively building
onto his initial year of narrative research regarding his changing views and methods in his classroom (Messina, 2000). In years two and three he set about changing his classroom approaches to better approximate the twelve principles associated with the creation of a Knowledge Building Communities (Messina, 2003). Key features of this study were the use of video to capture classroom activity for later review, journaling by the teacher to track instructional decisions, and referencing of the Knowledge Building Communities principles in his on-line planning space to better inform his classroom design (2003). As was the case with Hewitt’s study, Messina also created new measures to ensure that emergent issues were not lost but were instead incorporated into the next cycle of his design. These additional sources of data then served as a useful means of triangulation (Messina, 2003). By focusing on the core principles over the three phases of this study it is clear how the resulting Knowledge Building Community began to approximate the Knowledge Building Communities model as it had been expressed in the literature (Scardamalia, 2002; 1999).

The final study reviewed here was done by Jun Oshima at a university affiliated laboratory school in Japan (Oshima et al, 2003). What is immediately apparent in this study is that the researchers and the teachers had clearly expressed the vision of the educational change they were hoping to achieve. In this case it was to create Knowledge Building Communities in Japanese classrooms. To do this Oshima and his seven collaborators focused their attention directly on the twelve Knowledge Building Communities principles from the start of the study (see Appendix A) as they attempted to move the design of two different lessons in two subsequent years toward the Knowledge Building Communities model (Oshima et al, 2003). The differing lesson topics represented a confounding variable but as design researchers the goal was to generalize from the particular events of the first lesson to find the design principles that
appeared to be at play (Edelson, 2002). That these lessons were taught by the same teacher and were both in the domain of science was thought to minimize problems with the generalization of the design. Oshima and his team focused attention on the activity logs from the Knowledge Forum database, along with observational notes taken by the teachers and researchers during the lessons. They also created a categorization scheme to help rate the students’ notes into idea-based and fact-based categories (Oshima et al., 2003). It was determined that the students were engaged in writing and reading fact-based notes far more than idea-based notes. The results also indicated that the students were not functioning in concert with the principle of, “Community Knowledge, Collective Responsibility” because they were not working across the groups that had been formed at the beginning of their studies (Ibid). Oshima and his team reworked the design of the lesson in the second year to include design features that would encourage cross group collaborations and a focus on idea improvement. For instance, they elicited student ideas and allowed for a naïve theory to be the basis of the beginning of the lesson. They encouraged students to articulate a common goal for the study and they also constructed scaffolds for the students to use so they would have more opportunities to discuss their research both inside and outside the database (Ibid). Results in the second year indicated that students were more collaborative across groups and accessed more notes of both types. These changes were both indicators of increased concern for community knowledge and also suggested a movement consistent with becoming a Knowledge Building Community.

Experimentation in schools

Laurel Tanner, in her book about the first laboratory school suggested that the one retrievable innovation from that school was the concept of the school as a site of experimentation itself (Tanner, 1997). Certainly to ensure that new ways of teaching and learning are to be
successfully implemented in schools we must begin to establish new ways for teachers to work out in practice these innovative ways of teaching and they must begin somewhere. Weinbaum and his colleagues state that it is not enough to provide theory or even discussion about the theory (Weinbaum et al, 2008, p.69). They state:

The theoretical and practical information about new practices or objectives that is introduced when a new reform enters a school context is rarely sufficient to encourage innovation. Individuals expected to innovate need to be connected to networks that can provide the types of tacit information that is gained almost exclusively through experience and experimentation. (Ibid)

For the past century laboratory schools have served as sites for the prototyping of new educational approaches. In 1896, as head of the newly created Department of Pedagogy at the University of Chicago, John Dewey requested and was granted permission to start an elementary school within the university (Dykhuizen, 1973, p. 79). His argument to the president of the university, regarding his department’s need for such a school, was as follows:

The conduct of a school of demonstration, observation and experiment in connection with the theoretical instruction is the nerve of the whole scheme. Without this no pedagogical department can command the confidence of the educational public it is seeking to lay hold of and direct; the mere profession of principles without their practical exhibition and testing will not engage the respect of the educational profession. Without it, the theoretical work partakes of the nature of a farce and imposture – it is like neglecting to provide a laboratory for faculty and students to work in. (Dewey, 1896a, p. 434)

In this quote, as in others, Dewey’s original intention in creating the laboratory school is clear; it was to be a place within the university where approaches to education could be worked out in real terms in order to demonstrate their feasibility and the methods that make them feasible (Dewey, 1900 p. 94).

Laboratory Schools and the issue of transfer

Dewey stated clearly that his laboratory school was, “…not a model school” (Dewey, 1900, p.96). At the time he developed his school there were also Normal Schools, the main
purpose of which was the training of new teachers for service in the public schools (Dewey, 1900, p.96). For Dewey the training of teachers and the modeling of existing approaches were for others to do (Dewey, 1896b, p. 437). Yet how the new insights and approaches that were developed, at what became known as the Dewey Laboratory School, were to be picked up and translated into positive changes in the public school classrooms was never clearly defined (Cohen, 1998, p. 445; Jackson, 1990, p. xxxi). In a response to an unidentified teacher regarding her concerns over how different the laboratory school environment was compared to other school environments Dewey had little to offer in response to how she should proceed in her local setting (Jackson, 1990, p. xxxi). In a report to the university Dewey seemed to hint that the insights made at the laboratory school would make their way into other schools in a gradual way (Dewey, 1896b, p. 437). He said, “…it is the function of some schools to provide better teachers according to present standards; it is the function of others to create new standards and ideals and thus to lead to a gradual change in conditions” (Dewey, 1896b, p.437). However, how this gradual change in the educational conditions of public schools was to play itself out seems never to have been defined by Dewey. Perhaps he just didn’t have time to formulate this process before his departure from the University of Chicago’s Laboratory School in 1904. Dewey seems to have known the issue early on as he defined the approach that was to be associated with his laboratory school.

If it is advisable to have smaller classes, more teachers and a different working hypothesis than is at present the case in the public schools, there should be some institution to show this. The school in question hopes to do, and while it does not aim to be impractical, it does not aim primarily to be of such a character as to be immediately capable of translation in the public school. (Dewey, 1896b, p.437)

Given the educational climate into which Dewey had thrust his vision of schooling it is fair to say that it did show what was then newly possible in education. Unfortunately, laboratory
schools of today must rationalize their existence in more ways than simply presenting a vision of an educational ideal. Today laboratory schools serve multiple purposes including teacher education and the support of research programs at their respective universities (National Association of Laboratory Schools, 1991, p. 24). That laboratory schools could have a positive role to play in the reform of education seems not to be a serious pursuit for these schools (Tanner, 1997; National Association of Laboratory Schools, 1991, p. 164). Even when an innovation has been successfully developed at a laboratory school there is a marked disconnect between the public school environment and this new way of teaching. The issue then is how to move these approaches that have been developed in these reified situations into contexts that do not contain the same optimal conditions (Brown & Campione, 1996).

Professional development and the implementation of reforms

Over the past decade many education researchers have pointed to well trained and receptive teachers as a key component if reforms are to be effective (Ball, 1999; Cochran-Smith, 1991; Darling-Hammond, 1997a; Goodlad, 1994; Lieberman, 1995; Shulman, 1987; Shulman, 1999; Sykes, 1999). Most recently, in their exhaustive review of the literature on technology professional development for teachers, Lawless and Pellegrino came to the sober conclusion, “that there is a long way to go in understanding methods of effective practice with respect to the various impacts of these professional development activities on teaching and learning” (Lawless & Pellegrino, 2007, p. 575).

Clearly, the research and development of new models for the education of competent teachers, who will be able to take on the challenge of teaching in these new ways, is now looked on as essential to the success of these reforms (Ball, 1999; Shulman, 1999; Sykes, 1999). In the volume, Teaching as the Learning Profession (Darling-Hammond, 1999) it is stated that, “... the
key to producing well qualified teachers is to greatly enhance their professional learning” (Ibid, p. xv). Several innovations in teacher education have been tried over the past two decades to provide teachers with the opportunity to reflect on their practices to deepen their understanding of the curriculum (Darling-Hammond, 1997b). Generally, these programs have sought to improve teachers' content knowledge and pedagogical practices by encouraging teachers to be more reflective about their classroom practices (Rhine, 1998; Wells, 1994; Cochran-Smith, 1991).

In addition to promoting teacher development in teacher education programs there has been a concerted effort to create practice-based situations for professional development. The most salient of these has been the professional development schools or professional practice schools (Darling-Hammond, 1994; Levine, 1992). A review of attempts to create professional development schools indicates that these partnerships can be, “promising vehicles for allowing both pre-service candidates and practicing teachers to collectively develop and understand collaboratively, (innovative) learner-centered practices” (Darling-Hammond, 1994). However some problems are evident in this approach. As Teitel points out, "...not all of these relationships work out as planned. Some struggle in continuing relationships meeting the needs of neither party" (Teitel, 1998, p. 85). The most recent advances have been in the area of teacher communities as a support for new ways of teaching.

*Teacher communities and the implementation of reforms*

Teacher communities can be highly supportive environments for teachers to develop new ways of teaching but it is also the case that not all communities are equal and little is known about what makes one community better than another (Fishman & Davis, 2006; Little, 2003). The utility of teacher meetings as a site for supporting the implementation of new ways of
teaching has a growing literature base (Curry, 2008; Hughes & Ooms, 2004; Spillane, 2002). Theoretically based on the seminal communities of practice work of Lave and Wenger (Wenger, 1998), there is a growing position that teacher learning is situated, social and reflective and therefore highly suited to professional development that situates their professional development in exactly the same conditions they must practice (Stein, Silver and Smith, 1998; Scribner et al, 2007). Researchers (see Curry, 2008; Stein, Silver and Smith, 1998) have rightly oriented this research within a community frame, “the unit of analysis shifts from the individual to the social practice or the activities the group of teachers engage” (Ibid, p.738). The importance of discourse in these contexts has therefore also become the focus of many researchers in this area (Clark, 2001; Scribner et al, 2007). Coburn’s year-long study of the collective sense making that occurred at a high school as the staff attempted to implement new reading reforms clearly illustrated the manner in which situated conversations in “micro-cultures” of support help to mediate the environmental pressures that can be felt by teachers as they set about trying to make sense of a new innovation (Coburn, 2001, p. 145).

Recent research has suggested that gaining an understanding of the various channels of communication available in schools is important but also that reformers may want to consider “carving out” their own channel in the context of the school (Shiffman, et. al, 2008). In retrospect, it would appear that the study group meetings that were the focus of this research provide just such a dedicated channel for communication and exploration. One aspect of having this separate channel for the innovation to be explored and discussed appears to be related to the ability to focus on the implementation of the innovation without losing contact with the core principles. The role of the university researcher in this study was to bring attention to the core
principles during these meetings and to facilitate problem solving associated with any identified issues. The following section discusses creative problem solving in group situations.

**Creativity in groups**

In his book on group creativity Keith Sawyer (2003) summarized findings from the field of organizational creativity indicating theorists:

> Have found that the superior creativity of the self-managed team results from the interactional processes of (their) information flows: (and that) collaborative emergence is more likely to occur when information flows are faster, with a richer and deeper network of links among the team members (Sawyer, 2003, p. 181).

In engineering it is well established that the content of new designs emerges from the social interactions among the members of a design team (Minneman, 1991). Radcliffe’s 1996 study of engineering design teams suggests strongly that idea generation cannot be controlled so as to happen at specific points in time such as at designated meetings. On the contrary, his study found, “…that the emergence of design ideas cannot be constrained to a particular place or sequence in a systematic design methodology” (p. 362). In this study the face-to-face meetings of the study groups were organized to facilitate interaction by the members to help support the production of creative solutions to contextual concerns. In addition the Knowledge Forum environment was available for use both by the students and the teachers for the recording and discussion about the advancing classroom designs. In this way it was intended to support improved information flow and idea generation by helping members of the study group collaborate more easily with one another. The use of this environment at each of the sites is discussed. What follows is background on the technological support for collaborative groups.

**Technology-enhanced collaborative networks**

In his 1951 study of communication patterns in collaborative groups Leavitt examined the circle and star patterns of communication. His findings suggest that the more standard star
pattern of one person connecting to just one or two other members in a group is more effective on measures such as speed and clarity of leadership. However, he also found that the circle pattern, where all members have access to each other, was superior on three more contemporary criteria (Lipman-Blumen & Leavitt, 1999). The three contemporary criteria were; morale, creativity and flexibility (Ibid). In relationship to the functioning of a study group it is clear that multiple connections between the participants offered through the on-line environment would help to support the kind of interaction needed to develop creative ideas to address emerging design issues. Also, by situating the dialogue and journal writing of the teachers in the same database that the students are using to advance their knowledge there might be closer contact between the participants and core issues regarding how the innovation is worked out in practice.

Ann Lieberman (2000) in her review of technology-enhanced teacher networks found that these networks:

Attract teachers because they mount agendas that give teachers opportunities to create as well as receive knowledge. Teachers become members of a community where they are valued partners and colleagues, participants in an on-going effort to better the learning process for themselves and their students. (Lieberman, 2000, p. 226)

Lieberman (2000) went on to observe that the hallmark of successful collaborations seems to be to keep a balance between, “…inside knowledge (the experiential knowledge of teachers) and outside knowledge (knowledge created by research and conceptualization)” (Ibid, p. 223). That is to say that the networks that lasted were those that balanced lofty goals with the immediate needs of the teachers (Ibid). This finding is also supported by a study by Adams (2000) in which he found that networks benefit from links that connect participants to, “…a larger world of professional knowledge, expertise and experience” (p. 170). Brown & Duguid (1991) have gone so far as to say that professional networks provide the essential body of knowledge that is needed to support practice (also see Weinbaum et al, 2008).
Role of the critical other

Referred to as a “critical friend” (Curry, 2008), “mentor” (Schaverien & Cosgrove, 1997), “champion” (Zhoa et al, 2002) or “knowledgeable other” (Lewis, 2000), the role of group members who move discussions forward has been a topic of much research. Of particular note for this study is the work of DeLima (2001) in which he looked at the issue of whether these people should be considered “critical friends” or “friendly critics”. DeLima (2001) offered a strong caution about believing all teacher collaborative groups have the same possibility to support change (p.116). He stated, “Without cognitive conflict, teacher collaboration is dispensable” (Ibid). His cautionary note is that teacher teams that are solely based on friendship and thereby lack requisite levels of critique will not lead to changes in the educational approaches pursued in a school.

Critical Friends Group researcher Marnie Curry has looked at the affordances and constraints of a collaborative critical-friends model of professional development oriented toward the implementation of literacy reforms (2003, 2008). Curry’s case study research found that there were four design features of note: the diversity of the menu of activities, decentralized structure of the meetings, interdisciplinary structure, and use of protocols to structure the conversation (p. 733) that facilitated interaction but also limited it in significant ways. Curry reported that the reliance on structured protocols carried with them the need for the groups to negotiate complicated professional development choices (p. 734). She states,

Although CGFs (Critical Friends Groups) enhanced teachers’ collegial relationships, their awareness of research-based practices and reforms, their school wide knowledge, and their capacity to undertake instructional improvement, these professional communicates offered an inevitably partial combination of supports for teacher professional development. In particular, CFGs exerted minimal influence on teachers’ pedagogical content knowledge. CFGs would benefit from regular and systematic meta-cognitive and process-oriented reflections to identify how their collaborative practices might optimally advance their “bottom line” goal of improving teacher practice (Ibid).
Lee and Shula (1999) reviewed 54 studies and other pieces of literature related to the collaboration of teachers and researchers in projects. They found a split between the conceptually focused and empirically focused literatures which led them to suggest that the conceptual frameworks for describing the collaborative work of researchers and teachers did a better job of accounting for experiences encountered in these relationships (Lee & Shula, 1999). They went on to suggest that, “…a critical feature of collaboration in (the) conceptual literature, but not well attended to in practice, was the extent to which partners facilitated the clarification of language and the values embedded in that language” (Shula & Wilson, 2003, p. 655). That is to say that shared meaning making between the teachers and researchers was found to have been facilitated by them having, “...an abundance of shared experiences and quality dialogue over time” (Ibid).

Shula and Wilson found that:

There is also growing evidence that more in-depth collaborative partnerships-ones that yield insights into both the object of the inquiry and the learning processes that gave rise to these insights – leave their participants more capable of extending their understandings into new problem contexts. (Ibid, p. 655)

Taken together these studies suggest that there is a benefit to having a university researcher in the group but also that the sharing of stories is important to the success of these groups.

**Teacher thinking and educational reform**

The literature on teacher thinking as it relates to the implementation of new approaches to teaching and learning in the classroom has taken several forms (Clarke, 2003). This study is most closely connected to Donald Schön’s (1983) notion of the reflective practitioner (Clarke, 2003). For Schön teachers reflect on their teaching actions so they can be potentially changed and improved (Schön, 1983). There are two other main conceptions of teacher knowledge, as they relate to the implementation of new reforms, which have influenced this study. In their
review of the reform literature, Spillane and his colleagues (Spillane et al, 2002), defined a new way of thinking about the activities teachers must engage in when attempting to implement a new approach in their classroom. From their review they reasoned that to understand why innovations fail to be taken up successfully by teachers one has to look at the sense teachers are making of the innovation messages they receive (Ibid). Their model of teacher thinking related to the implementation of new reforms suggests explicitly that it is teacher sense making that must be considered as a key component in whether a teacher will successfully implement a new reform in their classroom or appear to be subverting that reform (Ibid, p. 388). Spillane and his colleagues also noted that sense making by teachers occurs in social situations where the teachers can consider how their situation relates to the proposed reform (Ibid, p 407-409).

The other conception of teacher knowledge that has informed this study is a version of Lee Shulman’s pedagogical content knowledge (1987). Shulman’s conception referred to the type of knowledge that a teacher needs in order to successfully teach specific content areas to students (Shulman, 1987). Researchers continue to use Shulman’s construct but some have sought to advance the definition to include other aspects of the teacher’s situation such as contextual knowledge (Barnett & Hodson, 2001) and technological knowledge (Mishra & Koehler, 2006). Barnett & Hodson (2001) developed a codified model of teacher knowledge they referred to as pedagogical context knowledge. Their framework is based explicitly on context knowledge as a key element in a teacher’s knowledge landscape (Ibid). This framework considers contextual spheres of knowledge far beyond the classroom-based pedagogical content knowledge (Ibid). These include professional knowledge, academic knowledge and research knowledge (Ibid).
Another framework that explicitly includes technological knowledge is described in the following section. This alternate framework appears to represent a useful advance on Shulman’s framework and situates teacher knowledge in terms of more local contextual concerns than the Barnett & Hodson framework. In addition it includes a focus on the technological knowledge a teacher might need to incorporate into their thinking to successfully include a new approach into their teaching practices.

*Technological pedagogical content knowledge (TPCK) & Context*

The technological, pedagogical content knowledge framework (TPCK – see Mishra & Koehler, 2006) is considered a useful development building on Lee Shulman’s pedagogical content knowledge model (1987). Over the past two decades there has been a steady increase in the availability of technology in schools (Zhoa, 2002) and it is argued that this has precipitated a need to include technological knowledge as a discrete form of knowledge that teachers must integrate if they are to teach successfully with technology (Mishra & Koehler, 2006). Shulman (1987) had inserted content into his framework as he had perceived that education was tipping too far toward a pedagogy-only focus (Shulman, personal communication, March 25, 2008). Mishra and Koehler’s addition of technological knowledge is now being presented as a pragmatic response to the need to focus attention on technology (Mishra & Koehler, 2007).

However, in recent writings on the subject Mishra and Koehler (Ibid) themselves have begun to present an additional component, the context, as a salient consideration in understanding how the TPCK conception can aid our understanding of what teachers need to consider when they are dealing with the, “wicked problems of teaching with technology” (see Figure 1). Lee Shulman had considered including context in his framework but rejected this component because his focus was on the insertion of content (Shulman, personal communication, March 25, 2008). He also
felt that a three-sphere model would be too complicated for what he was hoping to present for discussion (Ibid). He argued that the context is part of everything, that context is infused into both content and pedagogy so it need not be a separate knowledge base (Ibid). However, when it comes to examining the implementation of an educational innovation in the classroom a framework that examines the local context and its relationship to the reform to be implemented has considerable support (Spillane, Reiser & Reimer, 2002).

![Figure 1. Technological Pedagogical Content Knowledge framework with contexts influencing all teacher knowledge.](http://tpack.org/tpck/images/tpck/a/a1/Tpack-contexts.jpg)

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Socio-emergent perspective on small groups

There is a growing interest in examining the advances that groups of teachers make more from a socio-emergent perspective than from a purely cognitive perspective. It has been suggested that in order to make this move we will need to move to a, “small group unit of analysis” (Stahl, 2006). This idea is taken up in more detail in the methods section but for now a brief description is warranted about why this approach is fitting when we are trying to understand teacher sense making related to the Knowledge Building Communities model from an emergence perspective. Cobb and Yackel position it best when they describe emergence in the following way, “from (an) emergent perspective negotiation is a process of mutual adaptation that gives rise to shifts and slides of meaning as the teacher (and students) coordinate their individual activities, in the process constituting the practices of the classroom community” (1996, p.186). They go on to say that this process occurs while participating in and contributing to the practices of the local community (Ibid). It is my position that this is also the case for teachers in a study group focused on implementing a principle-based approach to pedagogy. Specifically, as a group they begin to work out the practices they are to implement and as a group they construct their practices, and their perceived understanding of the new approach in light of the local context through an emergent group process. It is a sub-goal of this study to develop a profile of the nature of the discourse in these types of study group situations that lead to changes in teachers’ perceived understanding of the innovation and how they implement the Knowledge Building Communities model in their local well-known context. Figure 2 represents to the implementation gap that must be crossed in order that the implemented version of the innovation will be in keeping with the core principles that define the model. In this case the innovation is that of the Knowledge Building Communities model.
Figure 2. The implementation gap between the foreign context where the educational innovation has been developed and the well-known context where the local teacher is accustomed to practicing.

Study Overview

Case studies involving three different school sites are reported to address the central proposition that: *discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them.*

Site I is the university laboratory school where study groups focused on a principle-based approach to understanding and implementing the Knowledge Building Communities model were first developed by this author. This case study presents the central proposition of this study. The Knowledge Building engaged in by the students and teachers at this site is set out as the best example of the Knowledge Building Communities model in elementary school, as reported in the literature, at the time of data collection for this study (Bielaczyc & Collins, 2006; Scardamalia, 2002).

Site II is an urban elementary school selected because of teacher and administrative interest in implementing the Knowledge Building Communities model. At Site II the study group
meetings were used to assist two teachers who wished to implement the Knowledge Building Communities model in their classrooms. As the work advanced this case offered particular insights into the influence of contextual concerns and the logistical issues that a study group may encounter. Embedded case studies of the two teachers at Site II are presented along with how the classes used the Knowledge Forum software.

Site III is a different urban elementary school and is a central focus of this report. Site III served to provide insights into how teachers unaccustomed to a principle-based approach to understanding and implementing a particular pedagogical model made advances along those lines. The participating teachers were diverse in their Knowledge Building Community experience but all were willing to try the approach over a two-month period in combination with weekly study group meetings. Embedded case studies focusing on these teachers are used to examine teacher sense making about the Knowledge Building Communities model (Scardamalia, 2002; see also Appendix A). Particular emphasis is placed on Kelly as she reported making significant changes to both her understanding of the principles and to her classroom approach.

At all three school sites the primary activity of the participant-observer was to assist the groups in focusing on Knowledge Building Communities principles. As the meetings evolved this role included facilitating problem solving related to use of the principles in specific contexts identified by the group. To better understand the discourse in the study group meetings a data display technique was developed to visually represent the pattern of the discourse that took place at key points in selected meetings at each site.

This study focuses on providing support for the teachers in the form of a study group. With the embedding of a university researcher (this author) in the group the functioning of these study groups was examined as a substantive support for teachers as they experiment with the
implementation of the Knowledge Building Communities model and how these experiences may influence their perceived understanding of the underlying Knowledge Building Communities principles. The following research questions were addressed in this study.

Research Questions

1. Does teacher perceived understanding of the Knowledge Building Communities principles change through participation in study groups focused on understanding and implementation of those principles?

2. In what ways do teachers’ practices, and perceptions of their practices, change as a result of participating in study groups focused on the analysis of principles underlying a pedagogical shift in practice?

3. What is the nature of the discourse in a study group focused on analysis and use of pedagogical principles supporting Knowledge Building?

Summary

It is understood that the scalability of an educational innovation such as the Knowledge Building Communities model requires focus on macro factors (i.e. school board policy); however, this study focuses entirely on the development of a professional development format at the micro or meso level (Owsten, 2007). Recent implementation research has suggested that working within nested contexts at the micro level can be influential when it comes to teachers making sense of a new innovation (Spillane et al, 2002). From the literature it also appears that consideration of contextual issues may be of particular importance to the success of an innovation. This study takes the view that we need to advance our understanding of how teachers make sense of the Knowledge Building Communities model in these nested contexts if we are to make significant advances on the scalability of this innovation. Although not based on their recommendations, the design of the study group meetings was consistent with what Spillane and Zeuli (1999) describe as an “enactment zone” where specific features come together: a social environment, allowing for rich deliberation between teachers and/or with reform experts, and the
sharing of material resources and/or artifacts. In the case of the later the Knowledge Forum database that the students were working in was always available during the study group meetings. The meetings and on-line environment for the teachers provided the social environment for study group interaction and the inclusion of a university researcher (this author) satisfied the inclusion of a reform expert. The heterogeneous composition of the group was also intended to avoid the shared beliefs and personal ties that might cut off consideration of alternative solutions to problems, a situation that has been reported in the literature (DeLima, 2002; Spillane et al, 2002; Dunbar, 1997). The methods chapter provides details about the case study, the methods that were used to uncover perceived teacher knowledge growth regarding the Knowledge Building Communities model, the level of the Knowledge Building by participating students as they used Knowledge Forum and the nature of discourse in episodes of the study group meetings.
CHAPTER 2: RESEARCH APPROACH & METHODS

Overview

According to Yin (2003) and Hartley (2004), case studies are well suited for research involving complex contexts. The essence of a case study according to Lou Smith is the researching of a “bounded system”, so that the researcher can tell a story about the complex happenings within that system (Stake, 1997, p. 406). In this study the system is the school-based study group that is focused on the implementation of the Knowledge Building Communities model, and the case studies are based on efforts to develop understanding and practices within that complex system. In this study the focus was on study groups at three sites, with teachers facilitating the design of principle-based classroom interventions as they gain perceived understanding of the principles underlying the new pedagogical approach. More specifically, the teachers are attempting to understand and implement the Knowledge Building Communities model in relation to their local context. At each site the study group served as the channel of communication for the implementation message associated with the Knowledge Building Communities model. In each context the study group dealt with time issues, curriculum expectations, student participation and issues related to the technology infrastructure. The teachers at each site were the main implementers of the approach and their interpretations and implementations are the central concerns of this report. A sub-concern of this report is the nature of the interactions of the study groups and their connection to the interpretations and resulting implementations in the classrooms.

Tables 1, 2 and 3 outline the data that was collected to address each of the research questions, along with procedures that were employed and an overview of data analyses designed to address each research question.
### Table 1. Research question #1: Data Collection, Procedures and Data Analysis

<table>
<thead>
<tr>
<th>Teacher ratings of KBC principles</th>
<th>Interviews with teachers</th>
<th>Interviews with students</th>
<th>Knowledge Forum® databases</th>
<th>Study group meeting transcripts</th>
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<tbody>
<tr>
<td>(See appendixes C, D and E)</td>
<td>(See appendixes F and G)</td>
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<td><strong>PROCEDURE</strong></td>
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<td>KBC principles survey administered before and after engagement in series of study group meetings to determine:</td>
<td>Teachers interviewed before and after engagement in study group meetings; Think-aloud about KBC principles as applied to local and ideal settings</td>
<td>A subset of students chosen by the teacher to represent low, medium, and high levels of participation were interviewed after classroom work related to this thesis had been completed;</td>
<td>Analysis of student and teacher database activity</td>
<td>1. Conjecture meeting to determine KBC principles to focus on</td>
</tr>
<tr>
<td>1. Perceived knowledge of KBC principles</td>
<td>2. Perceived applicability of KBC principles to local &amp; ideal settings</td>
<td>3. What is important to know about KBC,  4. Who was directing the KBC,  5. How was progress determined,  6. What materials/resources were available to the students, and  7. How KBC study concluded</td>
<td>8. Contributions (Reading and building-on) assessed using Analytic Toolkit and KF4.7 analysis tools:  9. Contributions,  10. Reading,  11. Build-on notes,  12. Social Network Analysis (SNA)  13. Writing profile (median student)</td>
<td>2. Study Group meetings</td>
</tr>
<tr>
<td><strong>DATA ANALYSIS</strong></td>
<td><strong>DATA ANALYSIS</strong></td>
<td><strong>DATA ANALYSIS</strong></td>
<td><strong>DATA ANALYSIS</strong></td>
<td><strong>DATA ANALYSIS</strong></td>
</tr>
<tr>
<td>Literature review and inductive coding yielded the following coding categories used to organize teacher analysis:</td>
<td>Students interviewed about KBC approach:</td>
<td>Students interviewed about KBC approach:</td>
<td>Students interviewed about KBC approach:</td>
<td>Focal meetings analyzed to examine discourse pattern related to:</td>
</tr>
<tr>
<td>1. Innovation (e.g. KF &amp; KBC principles),  2. Contextual concerns (e.g. Students &amp; curriculum),  3. Teacher change (e.g. Knowledge &amp; skills),  4. Experimentation/problem solving (e.g. Rise-above use, release of agency, increasing student access, commissions to change practices)</td>
<td>5. What is important to know about KBC,  6. Who was directing the KBC,  7. How was progress determined,  8. What materials/resources were available to the students, and  9. How KBC study concluded</td>
<td>10. Contributions (Reading and building-on) assessed using Analytic Toolkit and KF4.7 analysis tools:  11. Contributions,  12. Reading,  13. Build-on notes,  14. Social Network Analysis (SNA)  15. Writing profile (median student)</td>
<td>16. KBC principles,  17. Questions,  18. Stories,  19. Commitments, and  20. Distribution of conversation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site I</th>
<th>2 Teachers</th>
<th>2 Teachers</th>
<th>4 Students</th>
<th>Site I students also asked about use of rise-above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site II</td>
<td>2 Teachers</td>
<td>2 Teachers</td>
<td>4 Students</td>
<td>Site I - Rise-above activity</td>
</tr>
<tr>
<td>Site III</td>
<td>3 Teachers</td>
<td>3 Teachers</td>
<td>4 Students</td>
<td>Site III students also asked about start of next unit</td>
</tr>
</tbody>
</table>
**Table 2.**

**Research question #2: Data Collection, Procedures and Data Analysis**

<table>
<thead>
<tr>
<th>Research Question #2: In what ways do teachers’ practices, and perceptions of their practices, change as a result of participating in study groups focused on the analysis of principles underlying a pedagogical shift in practice?</th>
<th>Teacher ratings of KBC principles (See appendixes C, D and E)</th>
<th>Interviews with teachers (See appendixes F and G)</th>
<th>Interviews with students (See appendix H)</th>
<th>Knowledge Forum® databases</th>
<th>Study group meeting transcripts</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site I</th>
<th>2 Teachers</th>
<th>4 Students</th>
<th>2 Classes – KF views</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site II</td>
<td>2 Teachers</td>
<td>4 Students</td>
<td>2 Classes – KF views</td>
</tr>
<tr>
<td>Site III</td>
<td>3 Teachers</td>
<td>4 Students</td>
<td>1 Class – KF views</td>
</tr>
</tbody>
</table>
### Research question #3: Data Collection, Procedures and Data Analysis

<table>
<thead>
<tr>
<th>Question #3</th>
<th>Teacher ratings of KBC principles (See appendixes C, D and E)</th>
<th>Interviews with teachers (See appendixes F and G)</th>
<th>Interviews with students (See appendix H)</th>
<th>Knowledge Forum® databases</th>
<th>Study group meeting transcripts</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the nature of the discourse in a study group focused on analysis and use of pedagogical principles supporting Knowledge Building?</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
<td>SAME AS ABOVE</td>
</tr>
<tr>
<td>Site I</td>
<td>2 Teachers</td>
<td>Study Group - KF views</td>
<td>3 Participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site II</td>
<td>2 Teachers</td>
<td>Study Group - KF views</td>
<td>3 Participants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site III</td>
<td>3 Teachers</td>
<td>Study Group - KF views</td>
<td>4 Participants</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Throughout this report analyses focus on the following components of the work:

• teachers’ changing perceptions regarding the Knowledge Building Communities principles
• the nature of the Knowledge Building Communities that they developed in their classroom, as reflected in work conducted by their students in Knowledge Forum and teacher accounts regarding their students’ online and offline work
• post interviews with a subset of students from each class (the students were selected by the teacher to represent low, medium & high levels of engagement)
• patterns of teacher interaction engaged in during the study group meetings and in the Knowledge Forum database (episode selection was based on explicit mention of Knowledge Building Communities principles and/or identification of the episode as significant by one of the participants)

These analyses are discussed in the following sections; the following section outlines the design of the study.

Multiple-case design

The flexibility of the case study approach and its adaptability to local conditions (Yin, 2003; 2008) made this approach to research highly appropriate for this study. A multiple-case design was selected so that an initial proposition relating study group activity to change in teachers’ perceived understanding and implementation of the Knowledge Building Communities model could be established and then replicated in another school setting (Yin, 2003, p. 47). Yin asserts that multiple-cases follow a replication logic that suggests that there can be a literal replication, predicted similar results, or a theoretical replication, contrasting results for predictable reasons (Ibid). Yin goes on to say that this form of replication logic is different from
that which is applied when there is an expectation that a new sample will replicate the findings of a previous study (Ibid). In this study the multiple-case design was therefore selected because of its ability to allow for flexible adaptation to the local context and that gains could be based on replication logic that would allow for variance in the findings from each of the cases. The proposition to be replicated was that: *discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them.*

This study was initiated in the fall of 2004 and data collection at Site I was completed by January of 2005. This work involved group interactions focused on the Knowledge Building Communities principles. The teachers reported efforts to implement the principles in their classrooms and the effect on their perceived understanding of the Knowledge Building Communities model. Specifically, the two teachers at Site I focused on understanding and implementation of the Rise Above principle (#4) through this process.

Data collection at Site II began in the fall of 2004 but changes to the composition of the study group made it advantageous to restart the study group in January of 2005. The focus of this study group was on the Democratizing Knowledge principle (#7), and the Improvable Ideas principle (#2). The study group at Site II set out to meet bi-weekly but the teachers frequently met together in the absence of myself (the university researcher). This situation provided a unique opportunity to explore teacher-to-teacher communication related to implementing the Knowledge Building Communities model. Data collection at Site II was completed by June 2005 and the decision to seek a third site was made in the fall of 2005.

I approached Site III as I had previously worked with teachers at this school. The principal at Site III identified a group of three teachers who were interested in participating in
this study. The study group at Site III forms the central case for this report. The focus of this study group was also on the Democratizing Knowledge principle (#7) and the Improvable Ideas principle (#2) but also included a focus on the Knowledge Building Discourse principle (#11).

Table 4 outlines the sites, cases, teachers, grades, classes and students who were involved in this study. Yin defines six types of evidence that typically can be included in a case study (Yin, 2008, p. 102). These are: documents, archival records, interviews, direct observations, participant-observations and physical artifacts (Ibid). In this study, as indicated in Tables 1-3, I used documents in the form of the work done by teachers and students in the Knowledge Forum database, transcripts of semi-structured interviews with the participating teachers combined with a think-aloud protocol that asked the teachers to reflect on their understanding of each of the Knowledge Building Communities principles and to suggest how they could improve its position within their classroom implementation. Direct participant-observation was made of the meetings both as they occurred and in video recordings viewed after the meetings. Field notes of these observations were entered directly into the Knowledge Forum database so they could be member-checked on an on-going basis. At Sites II and III all of study group meeting videos were transcribed and form a document that was analyzed to examine the functioning of the study groups and their relationship to the teachers’ perceived understanding of the Knowledge Building Communities model in connection to the actual work that the students had done in the Knowledge Forum database.

Construct validity, or trustworthiness, was addressed by using these multiple sources of data (Yin, 2008). The Knowledge Building Communities principle-based model that this
Table 4.

Research sites/cases, teachers, grades, and students

<table>
<thead>
<tr>
<th>Research Site/Case</th>
<th>Teacher/Class name</th>
<th>Grade</th>
<th>Students with Signed Consent</th>
<th>Total students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site I</td>
<td>Zara</td>
<td>3</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Site I</td>
<td>Rick</td>
<td>5/6</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Site II</td>
<td>Wendy</td>
<td>4</td>
<td>17</td>
<td>33</td>
</tr>
<tr>
<td>Site II</td>
<td>Tanya/Don</td>
<td>4/5</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Site III</td>
<td>Chris</td>
<td>4</td>
<td>8 (split with grade 3)</td>
<td>8</td>
</tr>
<tr>
<td>Site III</td>
<td>Alice</td>
<td>4</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Site III</td>
<td>Kelly</td>
<td>4</td>
<td>17</td>
<td>26</td>
</tr>
</tbody>
</table>

The study set out to document is complex and by its very nature involves many different types of evidence. Yin has stated that another important reason to choose the case study approach is, "its ability to deal with a full variety of evidence (including) documents, artifacts, interviews, and observations" (Yin, 2003, p. 8). The internal validity of this study was addressed by establishing a predicted interaction of study group participation with changes in teachers’ perceived understanding of the Knowledge Building Communities principles and changes to the implementation of the approach in their classrooms.

My role as participant-observer allowed me to directly observe and interact with the, “interpersonal behaviors and motives” (Yin, 2008 p. 102) of the participating teachers, and to be able to intervene in these conversations to bring the Knowledge Building Communities principles to bear on the conversation, as I deemed appropriate. It was determined that these benefits outweighed the bias that the participant-observer role is known to introduce (Ibid). Construct validity was also addressed by inviting that the embedded teacher case study reports be
member-checked by the study participants. Only Wendy did not respond to this invitation. All of the other teacher participants responded and were supportive of the content of this report.

Consents

All of the parents of the students involved in the study signed permission forms that defined the nature of the participation and use of data for their child. Participation could include analysis of (a) Knowledge Forum notes and, (b) permission to interview the students and use (or not) the student’s name and image in publications. If parents did not give consent for use of student data it was not used in this study. Pseudonyms were assigned to all students and teachers. The ability to include all students in research is important when collaborative Knowledge Building is the goal. Thus needing to delete or move student data is problematic for this research, especially when substantial amounts of data needed to be discounted. Illustrative examples were used when larger-scale database analysis was not possible. Direct comparisons between cases from the three sites were conducted to support generalization (Yin, 2008). All of the participating teachers signed consents to participate in this research study.

Knowledge Forum analysis using the analytic tools

The databases that were used for this study were Knowledge Forum version 3.4 databases. Prior to the analysis of any of the database entries, data for students who had not consented to participate in this study were removed or moved within the database. The Analytic Toolkit, a set of analysis tools developed to be run on Knowledge Forum databases, was utilized to assess basic aspects of how the students and teachers had used the on-line environment. This toolkit operates on the database and provides basic statistical information related to number of notes written, percentage of notes read, and number of notes that were build on notes. With the conversion of the databases to Knowledge Forum 4.7 it was also possible, through use of Java
applets accessible from inside the database, to conduct additional forms of analysis, including Social Network analysis and to develop a writing profile plotted over time. In the Social Network analysis plot the participants are nodes and the lines in between the nodes represent connected activity between the participants (e.g. building on to each other’s notes). In addition, the Knowledge Forum 4.7 writing applet was used to explore the writing activity of selected median members of each class (based on number of notes contributed). The graph that is developed by the Knowledge Forum 4.7 writing applet includes a line to trace the number of words produced by the participant and another line to trace the diversity of those words plotted over time. Finally, for classes that used the rise-above feature of Knowledge Forum, the Analytic Toolkit was used to develop a profile of student participation related to the creation of these rise above notes. Taken together these analysis tools are used to develop an overall profile of the Knowledge Building Communities that existed at each of the classrooms in terms of the engagement and interactions of the students (writing, reading and building on), and their use of advanced features to facilitate their Knowledge Building (rise above).

Case Studies involving Sites I, II and III: Contexts and Participants

Site I

This site was a laboratory school at a Canadian university. The author of this report taught there, prior to this research study, and throughout the term of the study served as a university researcher and participant-observer for this study. The student population of the school is drawn primarily from middle to upper middle class urban neighborhood that surrounds the school. The principal was highly supportive of the Knowledge Building Communities model and research. Years earlier she had co-written the grant proposal that had brought the approach into the school and the technology infrastructure in the school was robust with high-speed
Internet and 1:1 and 3:1 computing in the grade 5/6 and grade 3 classes respectively. The laboratory school is a teacher education facility and as such it is required to follow the Ministry’s curriculum document.

Three teachers initially agreed to participate in this study; however the most experienced of the three, with seven years of Knowledge Building experience, withdrew because of scheduling conflicts. The other two teachers were Rick, who had four years of Knowledge Building experience, and Zara who had one year of Knowledge Building experience. Rick taught grade 5/6 (11 males and 10 females), while Zara taught grade 3 (11 male and 11 female – with one non-consenting student).

The topic of study for Rick’s grade 5/6 class was Ancient Civilizations while Zara’s grade 3 class studied Earth Science. The actual period of study was October to January 2005 and involved four study group meetings. The first meeting included Barb, the teacher who later withdrew because of scheduling conflicts, and the last meeting happened as teachers were moving on to new topics of study. So the two middle meetings, separated by a month, represent the best examples of study group interaction patterns at Site I. Meeting #2 was selected as a representative meeting for this study group because it occurred while the students and teachers were actively engaged in Knowledge Building and it involved discussion of the study group’s focal principle of Rise Above (#4). Teacher interviews were completed before and after the meetings had occurred while the student interviews were held in January.

Site II

The second site was a public elementary school in a large urban centre in Canada selected because of its substantial technology infrastructure and the interest expressed by teachers at the school in using the Knowledge Building Communities model and KF software. The principal
was very supportive and had encouraged the teachers to become involved, and eventually made
time available during the day, for two of the teachers to talk together about their Knowledge
Building work. The school had thirty computers in a library computer lab adjacent to the
classroom area. The school followed the Ministry’s curriculum document for science education
and closely followed the science units that satisfied Ministry curriculum requirements. The
population of the school was predominantly (>80%) second-generation children of immigrant
families, 64% of whom reported that they spoke a language other than English at home. After an
initial presentation to the staff two teachers agreed to be part of this study. Both were
experienced teachers, Don and Tanya.

Don was the teacher/librarian at the school. He had recently won a teaching award and
was responsible for supporting other teachers and their use of computer technology in the school.
To this end, the previous year, Don had completed, along with the participating teachers, an
“additional qualifications” course in Information Communication Technology (ICT) through a
local university. Don indicated that he felt the group of teachers had made gains with respect to
computer use and Knowledge Building but had also “hit a wall” in terms of understanding the
Knowledge Building Communities model and how to put it into practice. This had occurred
despite the fact the group had read papers written by the lead authors of the approach (e.g.
Scardamalia & Bereiter, 1996). Don expressed interest in being part of the study group partly to
see how he could have done things differently the previous year.

The other teacher who volunteered to be part of the study group was a grade 4/5 teacher
named Tanya. Tanya was also a highly accomplished teacher in the area of literacy development.
Tanya had also taken the additional qualifications course the previous year and anticipated that
her orientation to the meetings was going to be towards learning how to use the software as she
had felt the main problem the year before had been technical in nature. Due to the fact Don was not a classroom teacher it was negotiated that he would teach another teacher’s grade 4 class (Wendy’s class) using the Knowledge Building Communities model. Permissions to do research in these classrooms were completed affirmatively by twenty-six of thirty students in Tanya’s class while only seventeen of thirty-three students in Wendy’s class agree to participate.

As was the case with Site I, initial interviews were held with the participating teachers, Tanya and Don. Two meetings were held in October and November respectively and no meeting was held in December as Tanya withdrew from the study to take a job as a literacy consultant in her school board. After the December break the principal and Don encouraged Wendy to join the study group so we could restart the study. This change then led to Don’s movement from teaching Wendy’s class to teaching Tanya’s class instead. In consultation with the principal, Don, Wendy and I all agreed to continue meeting monthly partly in support of the students who had consented to participate in the study and to allow for the study group to proceed with a new set of interviews being completed in January with both Don and Wendy. Wendy was an experienced teacher who had participated in the additional qualification course the year before and shared Don’s concern about having hit a wall. She also looked forward to learning how she could have done things differently.

A scheduling and logistics issue at Site II represented a difficulty and an opportunity. Specifically, when the principal provided addition time during the day for Wendy and Don to meet it wasn’t always the case that the participant-observer was available to meet with them. As a result the teachers needed to proceed on their own and there were multi-week gaps between meetings. Given missed meetings and all the changes, including changed classroom assignments, this case study offers a unique perspective on the proposition as it relates to any changes, or none
changes, to the teachers’ perceived understanding of the Knowledge Building Communities model and their implementation of the Knowledge Building Communities model in their classrooms. For the purposes of this report Site II therefore represents a case that provides important insights particularly as they relate to teachers’ concerns about the reading, writing and the thinking abilities of students and the curriculum focus of the Knowledge Building Community. It is reasoned that the absence of the university researcher from many of the meetings may have altered the level of focus on the Knowledge Building Communities principles for this group.

*Site III*

The third site was selected for replication purposes (Yin, 2008; 1994). This site was selected because it presented a good opportunity to test the proposition that had been developed initially at Site I and had been refined through evidence gathered at Site II. Again the proposition is: *discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them.*

Site III had come to my attention because three teachers and the principal had previously attended the Institute for Knowledge Innovation and Technology (IKIT) Summer Institute. The school was entering its fourth year of using Knowledge Forum in their urban public elementary school. Students at this school were predominantly of Asian decent, while the school itself was a dual-track French immersion school with over 74% of the students reporting that they spoke a language other than English at home (e.g. Chinese). The offer to be involved in this study was strongly supported by the principal at Site III. The principal was an active supporter of teacher
professional development in her school sending teachers regularly to workshops and to visit other schools.

With respect to the curriculum, teachers at Site III followed the Ministry’s curriculum document closely, with the teachers organizing their instruction in units of study of approximately 4-6 weeks. It was decided that a shorter duration, with more frequent study group meetings would be employed at Site III, so the intervention would correspond to one unit of study. Data from the core set of four study group meetings for Site III, held in January and February of 2006, along with the individual interviews (pre and post), other meetings (conjecture and retrospective), and KF activity constitute the main set of data gathered from Site III.

With respect to the technology infrastructure, Site III was less well equipped with technology than either Site I or Site II, with the three participating classrooms being required to share a set of seven traveling laptops that were connected to the Internet through a portable wireless hub. However, this group of teachers demonstrated that they were highly skilled in managing this resource between themselves.

Three grade four teachers were involved. Alice was in her first year of teaching, Chris was in her forth year of teaching but was new to the school and Knowledge Building while Kelly was entering her third year of teaching all of which had been at Site II. Kelly’s class had seventeen of twenty-six students who consented to participate in this study, Alice’s class had eleven of twenty-one students who consented and Chris’ split class had all eight of eight grade 4 students consent to participate; however this last class didn’t use the database to any meaningful extent during the trial period. Therefore, although it was an intention of this study to address the need to coordinate student learning with teacher professional development (Curry, 2008; Lawless & Pellegrino, 2007; Fishman & Davis, 2006; Kubritsky & Fishman, 2006) the lack of student
data available for the Site III classes limited what could be learned from the impact of teacher development on student performance.

The science unit of light and sound was to be the focus for all three classes. This curriculum unit had already begun for one of the classes prior to the initial conjecture meeting that was held in January of 2006. Within this Site III case study, embedded case studies of the three participating teachers (Kelly, Alice and Chris) are reported. In anticipation of results to be reported in more detail later, it is important to point out that one of the teachers, Kelly, had been using KF and engaged in efforts to incorporate Knowledge Building practices since she had begun her teaching career two years earlier. She had attended the Knowledge Building Summer Institute with her principal three years earlier, so Kelly had seen this innovation develop until January 2006, when this study commenced. In her words she felt, “we are ready to take the next step” (Kelly, Pre-interview January 2006). Kelly’s transition forms the central embedded teacher case of this report both because of the change she reports and the extent of her class’ use of the KF database.

Methods to enhance case studies at Sites I, II, and III

Overview

It has been argued that mixed method approaches that combine qualitative and quantitative data collection and analysis techniques offer the best means of capturing the collaborative knowledge construction that occurs in groups (Hmelo-Silver, 2003). This study is primarily a qualitative case study however some quantitative analyses are included. Specifically the quantitative analysis tools built into Knowledge Forum were used to describe the level of database use by the teachers and students. In terms of the use of mixed methods to address research question #3: What is the nature of the discourse in a study group focused on analysis
and use of pedagogical principles supporting Knowledge Building; frequency counts of four coding categories as they occurred during selected episodes are used to support qualitative descriptions of what occurred in these meetings. What follows is a description of mixed method techniques that have been used to study the functioning of groups as they work together.

This part of the study is most closely aligned with (a) work done by Koehler and Mishra (Koehler, Mishra & Yahya, 2007; also see Mishra & Koehler 2004) on using design groups as a context for professional development, (b) Hmelo-Silver’s work (2003) on mixed methods approaches to understanding collaborative Knowledge Building, and (c) Scribner and colleagues’ work (2007) on the discourse patterns of teacher teams. Hmelo-Silver’s (2003) argues for mixed methods as a means of understanding how collaborative knowledge construction occurs. This position stems from her research on medical students’ use an on-line environment to learn about oncology. Hmelo-Silver demonstrates how frequency counts of the occurrences of categorized codes, in combination with a qualitative account of the nature of the interactions, can lead to a deeper understanding of the learning events, an understanding that she says extends beyond those than a single methodology could reveal (Ibid). The current study adopts Hmelo-Silver’s (2003) pragmatic approach to dealing with the massive amount of transcription data that is generated by a multiple site study by “zooming in” or focusing on the most salient episodes of the discourse to do a thorough examination of these episodes. In these focal portions of the transcripts I have adapted Hmelo-Silver’s graphical plotting strategy to assist with the analysis of aspects of the discourse that are related to the Knowledge Building Communities principles that were explicitly mentioned and the discourse that followed.
Meeting transcript coding and analysis

Commitment to take action

Scribner and his colleagues (2007) also used discourse analysis to uncover the nature of the interactions that took place in two teacher teams that had been charged with taking a leadership role in their school. Their analysis centered on the coding of the meeting transcripts for passive and active discourse following Searle’s (1976) coding categories. In addition, they linked these categories to aspects of the team’s situation in terms of the team’s mandate and how autonomous the teams considered themselves to be in terms of making the necessary changes (Scribner et al, 2007). For the purposes of this study I was most interested in the speech act related to teachers making a commitment to try something out in the classroom. This category is referred to in this study as a commissive statement.

Types of questions

Ozgur Eris has identified generative design questions (GDQ) in the work of engineering students who were designing paper bikes in a laboratory setting (Eris, 2004). Eris found that generative design questions are highly related to the generation of new knowledge in design groups (Ibid). He juxtaposed generative design questions type questions with questions that seek information or explanation. Eris termed these types of questions as deep reasoning questions (Ibid). In this study I coded as generative design questions, questions similar to “what if, how could we, and have we considered?” These types of questions are contrasted with the other types of questions that seek information or are intended to improve one’s understanding of the current situation. In the zoomed in sections of the transcripts I use these two coding categories (generative design questions and questions) to differentiate between questions asking about new possibilities (generative design questions) and those seeking clarifying information (questions).
Types of stories told – Contextual, Global & Projective

Not only are there complex webs of relationships that are developed through engagement in these types of study group arrangements there is also an opportunity to share stories about the local context, about the ways other have gone about approaching similar problems and about proposing new ways of approaching the problem. Like Hmelo-Silver, Koehler et al (2007) used frequency counts of occurrence of category codes, but in their work the codes were related to components of the Technological Pedagogical Content Knowledge (TPCK) framework. In one study, Koehler, Mishra and Yahya (2007) found that two design groups made up of teachers, graduate students and professors had significantly different interaction patterns and content of their conversation. For instance they reported that one group progressively reduced the percentage of disconnected segments while the other group, “had a persistent problem (getting content to work with, to the point) they were forced to think about content in the abstract… when a design approach is (really) premised on the promise of getting real experience early and often” (Ibid, p. 757). In the present study the goal was to ensure that the Knowledge Building Communities principles would not be discussed in the abstract but would be placed in contact with the study group participants’ attempts to experience putting the approach into practice in a real classroom, and then reflect on the results of that implementation. The telling of stories about how other’s had dealt with similar problems became known as “global” stories although they also tended to be stories about past solutions. The stories that raised local concerns or issues, of which there were many, were termed “contextual” stories although they also could be referred to as stories about present conditions and the final code was for stories that were “projective” about imagined other ways that the problem could be addressed in the future.
As Barnett and Hodson (2001) point out this type of group professional development opportunity provides a forum for teachers to learn about the local context both in terms of what is permissible and also what is expected in the local context. The study group format thus becomes a channel for both the reform message to get into the school but it is also a way for the teachers to enter into a dialogue with the reform message and begin to interpret that message in light of their own teaching and concerns they might have about how the approach will fit into their context. As might be expected much of this information is conveyed through stories.

Knowledge Building Community Principles

Coding for the Knowledge Building Communities principles was based on explicit references to the principles as named in the paper by Scardamalia (2002 – see Appendix A). Initially, coding for the Knowledge Building Communities principles included explicit and implicit codes but given the complexity of the descriptions for each of the principles, and the goal of exploring if the principles could be used to frame the discourse of the study group, the implicit code was dropped in favor of the explicit code.

Techniques to display and analyze group discourse

Scribner and his colleagues (2007) demonstrated through their research about distributed leadership that a methodology that focuses on the analysis of interaction is necessary to, “study the activities that lie at the heart of the social and the situational” (p. 93). The plotting of focus portions of conversation has become more common in work where researchers are attempting to uncover patterns of activity related to the discourse of a group (Koehler et al, 2005; Hmelo-Silver, 2003; Luckin, 2003). For instance, to display the interaction between group discourse and the use of features of a computer program Cindy Hmelo-Silver adapted Rosemary Luckin’s CORDFU (Luckin et al, 2003 - Chronologically Ordered Dialogue and Features Used). Hmelo-
Silver’s plot is referred to as a CORDTRA diagram (Chronologically-ordered Representation of Discourse and Tool-related Activity – see Figure 3).

Figure 3. CORDTRA—Chronologically-ordered Representation of Discourse and Tool-related Activity: Displays the overlap of coding categories over time. In this plot students move to elaborating (line 19) their understanding of the signs and symbols (line 22) of a patient’s disease after discussing the structure of the disease (line 20).


As can be seen in the CORDTRA diagram (see Figure 3) this type of plot is at first difficult to decode but once understood conveys a rich level of interconnection between the coding categories. Therefore a sub-goal of this study was to develop a technique to temporally represent the group discourse patterns in combination with the other coding categories mentioned in the previous section. Koehler and Mishra have also developed, “a representational scheme to graph the coded segments of each individual over time” (2007, p. 752 - see Figure 4), which is
temporally easier to follow but lacks the additional codes that Hmelo-Silver’s CORDTRA plot provides. What is unique about the Koehler and Mishra plot is the ability to follow the dialogue from speaker to speaker while also seeing clearly the codes that have been assigned to each segment. My goal in developing a data display technique was likewise to trace the interactions of the coding categories over time to explore if there was a pattern present in the discourse of the study groups and if it might be associated with finding from the case studies.

![Discourse diagram](image)

*Figure 4. Discourse diagram for one design group: Displays overlap of technological, pedagogical and content knowledge over time in one portion of the groups’ conversation.*


The CORD (Chronologically-ordered Discourse) plot I developed for this study is a hybrid of these approaches to data display. It traces the turn-taking in the conversation but also provides for the overlapping of multiple codes such that an interaction pattern can emerge from the conversational plot. In addition to including reference to the principles the transcripts from the coding of the focal episodes were selected based on indications from the participants that
these episodes were important to their development. I coded and created the Chronologically-ordered Discourse plot for Site I in order to explore the discourse pattern. The episodes for Sites II and III were independently coded by me and a second rater. Initial inter-rater agreement ranged from “moderate” \((k = 0.41 – 0.60)\) to “substantial” \((k = 0.61 – 0.81)\) for Cohen’s Kappa coefficient. We then discussed the codes and found agreement for most of the segments. In the few instances where we could not find agreement the code was not plotted.

*Interviews and principle ratings*

Appendices A to G present the instruments that were used for the interview component of this study. These include the Knowledge Building Communities principles (see Appendix A) that were presented to the teachers during the initial conjecture meeting (see Appendix B), interviews questions used to collect teacher ratings of the principles (see Appendixes C to E), a survey form to gather information about the participating teachers (see Appendix F) and a semi-structured interview protocol (see Appendix G). Finally, Appendix H contains the student interview questions.

Interviews and ratings of the twelve Knowledge Building Communities principles, which report both knowledge and value of the principles to the implementation, were carried out before and after the core set of meetings at each site. To assist in determining the teacher’s perceived understanding of the underlying components of the Knowledge Building Communities model each teacher was encouraged to perform a think-aloud about each of the Knowledge Building Communities principles. In addition they were asked to summarize, in a paragraph, their current understanding of the Knowledge Building Communities model. The meetings and interviews were recorded and transcribed. The Site III conjecture meeting (held after the pre-interviews but before the core set of study group meetings), retrospective meeting (held after the core set of
study group meetings) and the pre and post interviews for the Site III teachers were open coded (Glaser & Strauss, 1967) using NVivo to check that the major categories produced from the literature review appeared valid. Through a series of inductive and iterative decisions (Miles & Huberman, 1994) the initial codes were reduced to a core set of categories that represented the themes that had been identified through the literature review but also included the theme of experimentation and problem solving. The final coding categories included: experimentation and problem solving; teacher change in the form of knowledge and skills related to the Knowledge Building Communities model; contextual concerns in the form of perceived student limitations, time constraints and curriculum issues; and the innovation in the form of references to Knowledge Forum and to the Knowledge Building Communities principles. Versions of these categories are used as headings for the embedded teacher case study reports. Reliability of the coding was checked by having a random sample of ten percent of the Site III study group meeting transcripts (110 pages) re-coded by a second rater using the coding key in Appendix I. Reliability was found to be 92% on the initial codes assigned. The most common difficulty in finding agreement was related to short segments that didn’t carry enough information. The other discrepancies related to the overlapping of codes for segments that carried more than one meaning. These overlaps included discussing student contextual concerns as a contextual story and projective stories that started with generative design questions.

*Format of study group meetings*

Following methods developed by Paul Cobb et al (2003a), group meetings were held at the beginning and end of the core set of study group meetings to help structure the development and articulation of a “local theory of action” (Cobb et al, 2003b). In this study the two framing meetings took the following form and served the following purposes.
**Beginning of Study: Conjecture Meeting**

Development of a preliminary conjecture, teachers anticipated how the Knowledge Building Communities model would play out in practice in their local context. Key aspects of the Knowledge Building Communities principles were identified such that they could be worked on in subsequent meetings.

**End of Study: Retrospective Meeting**

The preliminary conjecture, from the first meeting, was compared to what actually occurred. The group was able to refine the initial description to describe how this innovation could be implemented in their context in the future.

Both of these meetings were designed to elicit a group response regarding the Knowledge Building Communities principles and to help define their local instructional theory related to the Knowledge Building Communities model (Gravemeijer & Cobb, 2006). The results from the first meeting were the focus of the subsequent meetings while the final meeting was used to summarize and assess the growth of the practical design that had been developed. During the retrospective meeting the group was also encouraged to comment on the functioning of the study group. With respect to the core set of study group meetings, as a participant-observer, I attempted to set to the agenda for the meetings by writing a note in the knowledge Forum database a few days in advance of the face-to-face meetings. This strategy proved ineffective, however, as it relied on the teachers being able to access Knowledge Forum from home or during school hours which most found quite difficult. Ultimately, the agenda for the meetings emerged at the beginning of each meeting and was based on the current concerns of the teachers.
Role of the university researcher in the meetings

At the beginning of the study I explained to the teachers that my role as the university researcher was mainly to present the principles of the Knowledge Building Communities model during the group meetings. I was explicit that I was also at the meeting to assist the group with considering how the Knowledge Building Communities model could best be implemented in their classrooms. Also, especially at Sites II and III, I found it helpful to relate stories of how others had implemented the Knowledge Building Communities model in other contexts. These types of stories I began to term “global” stories as they were not about what was happening in the local context (contextual) and they weren’t meant to describe how an issue could be dealt with differently in the future (projective). The global stories were offered to inform the group about the ways others had gone about solving a problem that seemed similar to the one they were dealing with at the time. It was also the case that I was the most knowledgeable about the Knowledge Forum software environment so questions about the software were commonly, but not always, directed to me.

Summary

This is a multiple-case design directed at exploring the relationship between participation in a study group and changes in teachers’ perceived understanding and implementation of the Knowledge Building Communities model. Embedded case studies of the teachers are also undertaken to explore their changing perspectives about the Knowledge Building Communities principles in terms of both perceived knowledge and perceived applicability of the principles to their local context. The methods used for this study were drawn from studies in the field of implementation research with the focus on standard methods of data collection associated with the case study approach (Yin, 2003). Data collection related to the first research question, how
do teachers’ perceived understanding of the Knowledge Building Communities approach change through participation in a study group, included semi-structured pre and post interviews, teacher ratings of the Knowledge Building Communities principles and a think-aloud protocol during the pre and post interviews. Interviews with students were held after the study group meetings had been completed and were used to triangulate against these teacher self-reports.

With respect to the second research question, in what ways do teachers’ practices, and perceptions of their practices, change as a result of participating in study groups focused on the analysis of principles underlying a pedagogical shift in practice, the Knowledge Building engaged in by the students was analyzed using the Knowledge Forum analysis tools. Interviews with a subset of students were again used for triangulation purposes. The study group meetings were preceded and followed by group meetings designed to assist the group with developing their local approach to Knowledge Building. These two focus group meetings helped to set the goals for the group and to reflect on progress.

With respect to the third research question, what is the nature of the discourse in a study group focused on analysis and use of pedagogical principles supporting Knowledge Building, a method for the coding and display of meeting transcripts was developed for use on selected episodes of selected study group meetings from each of the sites. The result is a Chronologically-ordered plot that is used to temporally bring together several coding categories to explore patterns of study group interaction and to develop a preliminary position on how the discourse in these study groups may have affected the teachers’ perceived understanding of the Knowledge Building Communities model and their implementation of the approach in their classrooms.
CHAPTER 3: CASE REPORTS

Overview

The literature reviewed for this thesis suggests that the implementation gap represents a serious impediment to educational change. There is a belief that lethal mutations alter the course of intended practices because teachers are not able to generate innovative practices based on the underlying structure of an innovation as outlined by the principles upon which it was built. The proposition to be explored in this study is that teachers are able to work with principles to implement change, change both in their perceived understanding of an innovation and also in their classroom practices. This research explores study groups as a potential way to accomplish principle-based change. Given this different perspective and Spillane et al’s, 2002 call for closer attention to the teacher, the innovation, and the context this study incorporates each of these factors into the design and the case study reports. In addition to presenting the context of each case study and descriptions of the embedded teacher case studies, both linked to the implementation of the innovation by the teachers and their changing perceptions about the Knowledge Building Communities model, these reports also include details regarding the contextual concerns that were considered by the groups and the experimentation that was engaged in by the teachers. For clarity these points are taken up separately in each of the embedded teacher case studies. Research question #3, which relates to the interactions in the study groups, is taken up in a separate section of this report. In that section analysis of the functioning of the study groups is approached from the perspective of examining group interactions during selected episodes that have been identified for their relevance to the proposition. The present section focuses on research questions #1 and #2 related to changes
classroom practices and perceived changes in teachers’ understanding of the Knowledge Building Communities model.

Site I

Overview

The study group at Site I set as their focus exploration of their approach to implementing the Rise Above principle (#4). The decision to make this their focus was a group decision arrived at during the initial group conjecture meeting when the group discussed each of the Knowledge Building Communities principles. Specifically, the idea of focusing on the Rise Above principle (#4) was raised by a teacher who had experience in using the Knowledge Building Communities model but had been disappointed in her use of rise above notes. The following excerpt is from the conjecture meeting and centers on their decision to focus on the Rise Above principle (#4). It is important to clarify that this conversation occurred at the beginning of the intervention and represents the groups’ beginning point in terms of the Rise Above principle (#4) and how to execute it. The initial conversation proceeded as follows:

BARB: Well, I think (Rise Above) it’s a way of gathering everything in the database and kind of summarizing what we’ve learned up to this point, or what our understanding is. And, you know, this is one that I don’t use enough, and part of it is a simple technical thing that I, sometimes it doesn’t work, I don’t know how to do it. Sometimes it’s as simple as that, sometimes I drag the note into the rise above and it doesn’t (work). It’s the changing, the constant yearly changing of the knowledge forum and how it works and somewhere along the way I got lost. So I think that’s why I do it less, to do it more I just need to learn how to do it. (64)

UR: Do you want to do it more? (65)

BARB: Yes. I think the best way it was done was when you did the teaching note. That was a good use of that, where, and then it was more the people in charge of the view…say it was the human heart, so they would be able to gather notes and make what was called a teaching note for their kids. Except the problem with the teaching note is that not everybody learns from the teaching note. (66)

ZARA: Do you think the kids who read it learned more? (67)
BARB: Yeah. Because we let them read teaching notes last year, for a human body test, and a lot of people couldn’t, didn’t do very well. (*laughter*) (68)

UR: So you kind of highlighted that (in his interview). (*to Rick*) (69)

RICK: I think it’s a developmental thing. I think what Michelle did in grade three with rise aboves was a collection of notes to clean up the view. In grade four it was more about a sorting the information into what we know and what we still don’t know. And I think in grade five and six it may have moved even deeper. So it definitely does help the children who are doing it, I’m not sure if it’s helping everyone else as much. My problem with the teaching note or how I used rise aboves, is that it would kill the inquiry. (70)

BARB: Yeah, it was the end. (71)

RICK: We brought it in at the end. And so children had this idea that okay, we’ve put all our notes in a box and it’s finished. And no one ever permitted himself or herself to do a build-on to a rise above. (72)

ZARA: And that’s what we were talking about, because my kids were distressed that they wanted to know things like can we do a build-on to a note when it’s in a rise above. Like they wanted to, they didn’t like the idea that it was in there and all packaged up. (73)

BARB: That’s a good point. (74)

RICK: I think this year I’m going to introduce rise aboves at the very beginning, like week two, so that they’re getting used to ‘okay, well all these notes are together, so if you want to do a build-on, so that there are build-ons to rise above’ because we’ve never done a rise above, I don’t know if we’ve ever gone so far that a rise above is continued within another rise above. The rise above is a tool really. (75)

ZARA: But it’s using it on an ongoing basis. (76)

RICK: Yeah, I think that’s the change for me. (77)

BARB: When it first came out we called it a vacuum cleaner. (78)

BARB: But kids didn’t like that if their notes were vacuumed. (79)

ZARA: No, and my kids would be angry, very insulted. (80)

BARB: So the rise above is something we need to work on this year. (81)

ZARA: I think. I would like to work on it, like how it looks, like what you were saying (*to RICK*) how it looks in grade three, four, five, six, and who does it because my kids— (82)

RICK: In the very first year we negotiated that everybody whose note was in the rise above
becomes automatically a co-author of that rise above, so you can contribute to it. (83)

ZARA: But I don’t think my kids would tolerate people making rise above... (84)

RICK: It might be...that’s the one that’s really for me developmental— (85)

ZARA: But I’d like to look at it— (86) (Site I – Conjecture meeting Oct 14, 2004)

From this discussion it is was established that all of the members of the study group felt that the Rise Above principle (#4) was one that they wished to explore improving the use of in their approach to executing the KBC model in their classrooms. This episode from the conjecture meeting, along with one from the second study group meeting, forms the basis for the proposition of this study that: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. In the case of the Site I study group their initial understanding of the Rise Above principle (#4) was by their own admission a primitive understanding that focused on the use of the rise above note at the end of an inquiry to summarize or vacuum up related ideas but that the tendency was that these summaries ended the inquiry for the students and also created stress for students about ideas no longer being able to be built upon.

This study group met monthly over a three-month period (October 2004 to January 2005) which included the initial conjecture meeting (October), retrospective meeting (January) and two study group meetings that were held in November and December respectively. During the conjecture meeting the group decided to focus on improving their implementation of the Rise Above principle (#4) through experimentation in both Rick’s and Zara’s classrooms. The second meeting was held in the midst of the two teachers working at this issue in their classrooms. This focus was reflected in the following database note:
We resolved that Rise Above was a principle that we as a group were going to look at improving over the coming months. There was a definite interest in the developmental nature to the implementation of the principle in grades 3 to 6. There was also an interest in using the tool inside the database sooner so students didn't see it as something only to be used at the end of their inquiry. Instead there was hope that it would serve to summarize so new builds on and rise above's could be created to move the inquiry forward. In his interview Rick also mentioned using the language of rise above in the classroom so it would be modeled outside of the database.

(UR - Posting in KF database, October 17, 2004)

Analysis of the Knowledge Building Communities principles that were explicitly referenced in during the October study group meeting (referred to as meeting #2) reveals that there were thirty discrete references made to the Knowledge Building Communities principles and that they covered all of the Knowledge Building Communities principle except for Symmetric Knowledge Advancement (#8) (see Figure 5).

![Figure 5. Site I – Explicit references to the KBC principles during study group meeting #2. Range is 0 to 6 reference.](image)

The teachers involved in the Site I study group were quite willing to experiment with their implementation of the Knowledge Building Communities model in their classrooms. The
result, a month after the first meeting, and at the point of the second meeting, was that both teachers were starting to look for better ways to make rise above occur in their classrooms, both in the database and in student conversation, and in ways that would be developmentally appropriate for their students. During the second meeting the group also identified the Knowledge Building principle of Constructive Uses of Authoritative Sources (#10) as another principle requiring their attention.

In our meeting last week we discussed how the work has gone and the possibility of moving to a slightly different focus for the next 4 weeks. Zara and Rick agreed that getting the students to create rise-aboves sooner had changed the nature of the views in terms of pulling ideas together.

We discussed the research project that would like to have them create a separate view for the students to examine the state of their knowledge. After some discussion we resolved that (Rick and Zara) would prefer to keep the students in the view but would like to create a place where knowledge advances could be placed. We also talked about using the publication feature (of the KF database) so students could begin to identify ideas that constituted a contribution to the database. Upon reflection I think this relates to the principle of Community Knowledge Collective Responsibility. Rick thought his class could do this but Zara thought this would be too much for her (Grade 3) students. She felt the creation of a patch would be enough. The other aspect of our conversation was around the Constructive Uses of Authoritative Sources. Zara really felt her class could do with some (more) focus on this issue. She will work on bringing more authoritative sources into the inquiry over the coming 4 weeks.

(UR - Posting in KF database November 24, 2004)

Analysis of both Zara and Rick’s self-reported ratings of the Knowledge Building Communities principles (see Table 5), before and after the study group meetings indicates that they felt they had changed their understanding and valuing of the principle of Rise Above (#4) in combination with what they felt were the related Knowledge Building Communities principles of Embedded Transformative Assessment (#12) and Idea Diversity (#3). They also both reported that they felt they had gain appreciation and understanding of the principle of Pervasive Knowledge Building (#9). Neither teacher reported having made a gain in understanding the focal principle of Constructive Uses of Authoritative Sources (#10). During the third meeting they both reported
Table 5.

Knowledge of principles and study group meeting focus on principles – Site I

<table>
<thead>
<tr>
<th>Principle discussed explicitly during the analyzed meeting (frequency)</th>
<th>Reported change in knowledge and/or importance of the principle</th>
<th>Zara</th>
<th>Rick</th>
</tr>
</thead>
<tbody>
<tr>
<td>* indicates principle was identified as a group focus at the beginning of the series of meetings</td>
<td>--- indicates no change</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>** indicates that at the end of the meetings the participant identified the principle as having been a focus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Principle</th>
<th>Frequency</th>
<th>Zara</th>
<th>Rick</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Real Ideas, Authentic Problems</td>
<td>Yes(2)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2. Improvable Ideas</td>
<td>Yes(2)</td>
<td>---</td>
<td>UP</td>
</tr>
<tr>
<td>3. Idea Diversity</td>
<td>Yes(1)</td>
<td>---</td>
<td>UP</td>
</tr>
<tr>
<td>4. Rise Above</td>
<td>Yes(6)*</td>
<td>UP** (Identified connection to Rise Above)</td>
<td>UP** (Identified connection to Embedded Transformative Assessment and Idea Diversity)</td>
</tr>
<tr>
<td>5. Epistemic Agency</td>
<td>Yes(4)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6. Community Knowledge, Collective Responsibility</td>
<td>Yes(1)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7. Democratizing Knowledge</td>
<td>Yes(3)</td>
<td>UP</td>
<td>---</td>
</tr>
<tr>
<td>8. Symmetric Knowledge Advancement</td>
<td>No(0)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9. Pervasive Knowledge Building</td>
<td>Yes(1)</td>
<td>UP</td>
<td>UP</td>
</tr>
<tr>
<td>10. Constructive Uses of Authoritative Sources</td>
<td>Yes(5)*</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>11. Knowledge Building Discourse</td>
<td>Yes(2)</td>
<td>UP**</td>
<td>---</td>
</tr>
<tr>
<td>12. Embedded and Transformative Assessment</td>
<td>Yes(5)</td>
<td>UP** (Identified connection to Rise Above)</td>
<td>UP** (Identified connection to Rise Above)</td>
</tr>
</tbody>
</table>

that they hadn’t had time to work on this principle as the holiday season had been approaching. It should be noted that Zara’s change in her understanding of the principles of Knowledge Building Discourse (#11) and Democratizing Knowledge (#7) was not as a result of the study group meetings but occurred because she had set her own goal of improving the nature of the discourse in her classroom, a focus she had been nurturing for several years. Given their positions teaching
at a laboratory school it is not unexpected that these teachers would so readily experiment with their own teaching. The connection between the other two principles, Rise Above (#4) and Embedded Transformative Assessment (#12) occurred during study group meeting #2, during an episode about how posting the rise above notes on the view, for the group to see what knowledge work had been developed, also helped promote the basic goals of the Community Knowledge, Collective Responsibility principle (#6) and the Embedded Transformative Assessment principle (#12). In the second meeting the teachers related these two principles to what they were doing in the classroom. Again, it is the proposition of this study that discussion of the Knowledge Building Communities principles in the study group meetings will support changes in perceived understanding of the Knowledge Building Communities principles and contribute to the implementation of the Knowledge Building Communities model in the classroom.

*Analysis of student database work – Site I*

The following analysis of Knowledge Forum database activity provides a profile of student work for both Rick and Zara’s classes. It also serves to triangulate the changes reported by the teachers. The following analysis tools were used: Social Network analysis tool to assess build on behaviors; the Analytic Toolkit to assess the distribution of notes contributed, the percentage of notes read, and also the distribution of participation in creating rise above notes; and the Writing tool to present a profile of the writing activity of a median student in each class based on the number of notes they had contributed. A description of the most salient features of the database work is also included along with a description of the Knowledge Building problem that the study group worked on over the time the group was active.
The following analyses are based on student notes written during the core study period from October 2004 to January 2005. Each class is reviewed separately as, although they had a similar design goal, there are also contrasting features in their class profiles.

*Grade 5/6 Ancient Civilizations - Rick*

Rick’s class took up the curriculum-based area of study known as Ancient Civilizations. Rick recounted how the study began in a note in the Knowledge Forum database.

We began the unit by “telling” students that we were studying Ancient Civilizations rather than waiting for them to direct the curriculum in that direction. On the whiteboard, we brainstormed what we know about the topic. While listing civilizations that we know (Ancient Greece), student 142 suggested Medieval Times. The question came up if this was a great civilization or ancient and we created a new column of “what we need to know”. Student 147 suggested we use posters, student 127 suggested we create models. As a result, we created a “what we want to do” column. We later changed this to “Embedded Transformative Assessment”. A photo of the whiteboard is used as the background of our view. Thursday October 28, the class brainstormed in their research books what the components of a civilization are. We shared that information on Wednesday November 3 and recorded our ideas on the whiteboard. Thursday November 4, the students worked in half groups to record questions and initial theories on KF. We read many notes aloud and quickly realized (in the grade six group) that we need rise above notes. This was particularly suggested by student 132. Weekly homework is to research an assigned Ancient Civilization from Asia, identify its timeline, its location, and any innovations and technology. Also to think about what qualifies it to be a civilization and “great”.

(Rick – Teacher posting in KF database, November 4, 2004)

The study then moved on to examine different Ancient Civilizations but with the following overarching student generated questions: “What qualifies as a civilization?” and “What makes a civilization great?” The original view in the database had the student’s questions embedded in the background of the view (see Figure 6). This strategy took the normal sticky idea of having the students write their question out in private and post them on the wall, and instead allowed for a period of “problem finding” to transpire off of the computer and then to have these ideas merge with the on-line environment such that student can write notes about these ideas.

The work continued for three months, amongst many other school activities.
The final Ancient Civilizations view (see Figure 7) indicates that the group had continued to develop their problem space to include five main questions that included the two original questions, expanded to include the following issues: “Why ancient civilizations fall?” “Whether a belief system is important in defining an ancient civilization?” “What qualifies as an ancient civilization?” and “Whether we are living in a great civilization?” For each of these questions the class created a corresponding rise above note that was updated between 2 to 5 times over the following weeks (e.g. what qualifies as an ancient civilization was edited 5 times over a two month period). Each class member had responsibility to research and shares with others a specific ancient civilization.
The analytic toolkit that underlies Knowledge Forum® was used to generate descriptive statistics about the use of the database. With respect to the main Ancient Civilizations view Rick’s class (n = 22) averaged 6.9 notes per student (SD = 3.85) with 64.1% (SD = 19.34%) of the notes having been read by the group and 51.4% (SD 25.33%) of their notes being build on notes. In the total set of seven research views (e.g. Ancient Norse, Ancient Greece etc…), including the main Ancient Civilizations view, this class (n = 22) averaged 17.4 note contributions (SD = 10.53), 42.8% of notes read (SD = 16.53%) and 33.2% (SD = 16.09%) of their notes being build on notes. In terms of working across the eight research views Rick’s class only worked in 3.3 views (SD = 1.61) suggesting that they didn’t go beyond the main Ancient Civilizations view, their own research view and perhaps one other view. This statistic is somewhat misleading as the heuristic that the class developed meant that information from each of the “working views” was to be brought out to the main view. This suggests that the students
did much of their work in their research view but that they didn’t interact with each other there but instead did so in the main research view where half of their notes were build on notes. The reading value for the main Ancient Civilizations view also indicates that the students were attempting to keep up-to-date on each of the central questions of the group. Figures 8 and 9 present the distribution of the contributions and the reading activity for each student in the main Ancient Civilizations views. These distributions suggest that the entire class was participating in the Knowledge Building.

Figure 8. Rick’s class--Ancient Civilizations views: This bar graph shows the number of notes contributed by each student to their class database; range 3 notes (student 148) to 45 notes (students 130 & 131)
Figure 9. Rick’s class--Ancient Civilizations views: This bar graph shows the percentage of notes read by each student to their class database; range 14% (student 146) to 93% (student 138)

Figure 10 presents the writing profile for Student 129 who was selected as a mid-range student based on the number of notes contributed to the main Ancient Civilizations view (range 0-16 notes). From the graph it can be seen that the most active period in terms of writing for this student was in November when the Ancient Civilizations study began and the students started researching their own Ancient Civilization. The brevity of this participation profile suggests that this inquiry may not have been as pervasive for this student in terms of class-time to participate in the database. However, when the student was able to write in the database the content of the note was notably different in terms of the diversity of the words suggesting that new content was being added to the database and in turn to the class discourse about Ancient Civilizations.
Figure 10. Rick’s class—Ancient Civilizations: The line graph shows the writing profile of a mid-range student the most active point being mid-November to mid-December. The range for words produced is 0 words to approximately 1700 words and the diversity of the words is 0 words to approximately 525 words.

Figure 11 presents build-on interactions for Rick’s class during the Ancient Civilizations study. It displays whether students write notes that contribute to and extend the ideas of other students. The sociogram in Figure 11 indicates that the grade 5/6 students in Rick’s class were moderately well connected in terms of building on with a density of 24.24% when the threshold was set at one interaction between each student. This is most likely a function of the fact that students worked in separate views, with the predetermined heuristic that they would bring findings of value to the rest of the group by placing them in the main Ancient Civilizations view. This strategy, which was developed through interaction between Rick and his class, was settled on early in the intervention and was not altered for the balance of the study group period.
Figure 11. Rick’s class--Ancient Civilizations view: Sociogram of build on interactions between all students with the threshold set to display at least 1 interaction. 56 edges and a density of 24.24%.

Figure 12. Rick’s class--Ancient Civilizations view: This graph shows the distribution of student participation in the creation of rise-above notes ranging from 0 (student 128) to 5 (student 131)

Although the use of Rise Above was discussed as being more than simply the use of the rise above note in the database it is interesting that less than half of Rick’s class actually
participated in the making of these notes during the study group period (see Figure 12). One student, student 131, created the majority of the rise above notes. This suggests that the strategy that had been developed to manage student ideas was not used pervasively by all students in the class. Student perspectives on the use of rise above notes and the focus on the Rise Above principle (#4) are presented in the following section.

**Student perspectives – Rick**

A subset of students were identified by Rick as being either low, moderate or highly engaged in the ancient civilizations study. From these students I interviewed four students, one low, two moderate and one high. This pattern of student identification and selection was repeated for Zara’s class and the other classes at Sites II and III. All of the students from Rick’s class who were interviewed were able to identify the main focus of their class study as well as many of the main questions being addressed by members of the class.

**Student responses to the following questions are reported below.**

*What is important to know about the Knowledge Building Communities model?*

**NOTE:** Students make reference to “KB Talk”, this is short for Knowledge Building Talk. In a mature Knowledge Building Community students move flexibly between different media to support Knowledge Building Discourse—for example, Knowledge Forum® to support computer-mediated discourse and classroom conversations to support face-to-face discourse. Use of a discourse that entails a commitment to advance the knowledge of the group is central to a Knowledge Building Community; the Knowledge Building Discourse principle (#11) is the corresponding Knowledge Building Communities principle. Student responses for Rick’s students about what is important to know about the Knowledge Building Communities model were:

“Keep going and that there is no real end to it” (student 132)
“Don’t go into groups too much, make everybody read all the notes and make sure they are doing what they are supposed to study so everyone can get the information out of it” (student 144)

“Should know that they can write anything on the view that they are thinking about the subject and they shouldn’t feel they are going to get laughed at” (student 130)

“You shouldn’t think about only your notes (you should) open it up. Share information. Notes are a good place to put ideas. Know what you are studying. You have to understand and research a lot. You really have to know your knowledge” (student 136)

Student responses to the questions about what is important to know about the Knowledge Building Communities model revealed that in Rick’s class there was a sense about their class being a safe environment to take risks in presenting ideas but also where there is an expectation that they are responsible to each other to share and build knowledge. One student also implies that in the Knowledge Building Communities model ideas can be continuously improved, that there needn’t be an end to the study. This reference to the continuous improvement of ideas suggests a developing understanding of the essential feature of the principles of Rise Above (#4) and Idea Improvement (#2). References to the sharing of information and responsibility to each other also indicated an appreciation for the principle of Community Knowledge, Collective Responsibility (#6).

Who decides how Knowledge Building happens?

“As a class we decide” (student 132)

“The class decides. Rick lets us decide what we do and how we do it” (student 144)

“A lot of the time it is the kids that make the decisions in the class. Rick doesn’t always say “you do this, you do that” but sometimes he will say “we are working on rise above today” but we usually figure it out on our own” (student 130)

“Teacher helps get big questions” (student 136)

With respect to their comments about agency over their ideas and the processes by which their knowledge work proceeds in the classroom it is clear that the Rick’s students feel they have
an influence over the functioning of the Knowledge Building Community in their classroom. Student 136 indicates that the teacher helps to shape the big questions while student 130 felt that the teacher sometimes stepped in to direct the focus of the class toward some aspect of their knowledge building. But overall there is support that Rick’s class is instantiating the principle of Epistemic Agency (#5) by allowing students room to negotiate how knowledge will be built in their Knowledge Building Community.

*What materials do you have in the classroom?*

“KB Talks, groups, books, Internet” (student 132)

“Books. KB Talks, Internet” (student 144)

“For some of our questions we use the Internet and books” (student 130)

“Presentations and models” (student 136)

With respect to the materials that the students have access to in order to be able to carry out their knowledge building work it is clear from the interviews that this classroom has a rich supply of materials that fit with principle #10 Constructive Uses of Authoritative Sources. It is also interesting to note that two of the students view the Knowledge Building Talks as a form of material in their classroom. In Rick’s class group meetings were used to share information and deal with emerging problems of understanding.

*How do you know you are making progress?*

“I think we decide by asking if the questions have been answered. We sometimes have a KB Talk” (student 132)

“It’s when we get to know a lot about (Ancient Civilizations), we read all of the notes” (student 144)

“In this section (Ancient Civilizations) when we know we are starting to answer those really big questions from the beginning then we really know we are making progress” (student 130)
“I think we know because people are understanding more. We (also) have KB Talks”
(student 136)

Note that to assess progress students refer back to the original “big” questions and to the content of the Knowledge Building Talks. Student 144 also points to the reading of notes as a way of assessing their progress. None of the students mentioned taking a test or any other external means of assessing their progress, but they did mention reading to determine if their ideas were advancing (Embedded Transformative Assessment (#12) and Constructive Use of Authoritative Sources (#10)).

*How should Knowledge Building end?*

“Could go on forever” (student 132)

“We are going to make all the published notes all of the subjects in Ancient Civilizations (and move them to a Hong Kong school’s database) (student 144)

“Finish our presentations and move our notes to the Hong Kong database” (student 130)

“Doesn’t end. If you start(ed) at 5 (years old) you could end at 30 (years old) (student 136)

Student 132 again stated that Knowledge Building could go on forever as did student 136 who also felt there could be an end but it would take decades to make it there. Both of the other students who were interviewed mentioned that their particular study was being brought to an end locally by publishing their notes for use in another database. Specifically, their published notes were going to be moved into a Hong Kong database so students in a Hong Kong school could build onto the knowledge that had been developed by Rick’s class. This action of moving the knowledge “out,” to benefit others is in keeping with the Knowledge Building Communities principle of Symmetric Knowledge Advancement (#8). Ratings by the teachers in this and the other case studies indicated that this principle was the least well understood or appreciated of all
of the principles. However, it appears that without defining it as such Rick’s class was engaging in a form of Symmetric Knowledge Advancement (#8).

*Rise above*

A supplementary question was asked regarding the rise above work as Rick and Zara had set advances relating to the Rise Above principle as a goal for themselves. Figure 12 showed the distribution of contributions to rise above notes in Rick’s class. Despite the fact that Rick focused on rise above less than half of the students in his class created this type of note. Nonetheless, from their responses it is clear the interviewed students all felt that earlier use of the rise above notes had allowed them to more easily navigate the database. A few also felt they were able to deal with more questions at the same time through the use of the rise above notes. None of the students reported seeing the use of rise above notes as problematic or terminal which had been a concern of the teachers at the beginning of the study.

*Summary - Rick*

The changes reported by Rick in terms of his focus on the Rise Above (#4), Community Knowledge, Collective Responsibility (#6) and Embedded Transformative Assessment (#12) principles are moderately well supported by the KF database analysis and student interview data. The database analysis suggests that there wasn’t democratic engagement in rise above across all members of Rick’s class. However, students indicate that the in-class activity of hold group Knowledge Building Talks was important to the advancement of their knowledge work. The heuristic that was developed to “manage” student ideas in the database and provide a way for sharing information is not entirely in-line with the generative manner in which one would expect a Knowledge Building Communities to operate. However the strategy did achieve the essence of the goal that Rick had set for his class, to instantiate his understanding of rising above earlier and
more regularly in the classroom implementation of the Knowledge Building Communities model.

*Grade 3 Earth Sciences - Zara*

Zara’s class began the year with a discussion about whether they should continue on with the study they had left off with the year before, the study of their school building’s history. This concept of the continuous improvement of ideas is in keeping with principle of Improvable Ideas (#2). In Zara’s case this was possible because the class cohort had stayed intact and Zara had moved with the class from grade 2 to grade 3. After a few class meetings they decided that they would continue to have the Knowledge Forum “school building history” view available if anyone wanted to work on it but that they also had many questions about the earth that they wanted to address. A view was created in the database call, “The Ways of the Earth” and the students began writing in their questions and theories in this view. From this single view, over the following four months Zara’s grade 3 class developed ten research views including: Day and Night; How does the earth spin?; Cycles of the earth; Natural disasters, Seasons; The earth, the sun and the moon; Gravity; Sun and stars; and Time Zones. Each of these views was created by agreement of the whole class during one of the Knowledge Building Talk times held on the carpet with the Knowledge Forum database open on a screen so the whole class could see it. Although the students’ had particular interests they were also allowed to work in whichever view they felt they could make a contribution to or that they needed to learn about the topic in that view.

Zara’s class (n = 21) was very productive in terms of their average for writing notes (38.7 notes each, SD = 19.33) and the percentage of notes read (48.30% read, SD = 20.83%). Given that there were 900 notes in the research views for their class this level of reading coverage alone
is impressive. In terms of the eight research views that the student worked in (reading, writing and building on) Zara’s students averaged 9.3 views (SD = 1.86). This suggests that the students in Zara’s class were reading and writing in the majority of the research views.

![Figure 13. Zara’s class—Ways of the Earth views: Distribution of contributions showing the number of notes contributed by each student to their class database; range 10 notes (student 91) to 88 notes (student 100)](image)
**Figure 14.** Zara’s class—Ways of the Earth views: Distribution of reading showing the percentage of notes read by each student to their class database; range 22% (student 104) to 97% (student 100)

**Figure 15.** Zara’s class—Ways of the Earth views: The line graph shows the writing profile of a mid-range student (Student 98) who was active throughout the inquiry. The upper line indicates the writing activity ranges for 0 words to approximately 1200 words with the diversity of the words ranging from 0 words to 300 words.
In terms of individual writing behaviour, student 98 was selected as representative of a mid-range student (range for note contribution for this group was 10 to 88, see Figure 13). With 42 notes written, this student was almost as productive as the top writer in Rick’s grade 5/6 class however the quality of the notes can be brought into question based on the diversity of the words included in the notes (see Figure 15). The word diversity measure (lower line) indicates that the diversity of the words being used in student 98’s notes was not increasing at as high a rate as in the grade 5/6 class. However the consistency of the entries over time does suggest that student 98 was engaged in writing in the database on a very regular basis although the diversity of their notes wasn’t vastly different from session to session. This supports Zara’s concern about bring more authoritative sources into the classroom.

![Figure 16. Zara’s class--Ways of the Earth views: Sociogram of building on showing interactions between all students with the threshold set to display at least 1 interaction. 144 edges and a density of 68.57%.

With respect to the class’ build on interactions there is a high level of density in terms of student-to-student building on. This is mostly a function of the fact that over 80% of all of the notes that they wrote in their research views were build on notes and because they wrote over
800 notes as a collective group. In Figure 16 the resulting sociogram, when displayed as a wheel, begins to suggest that all students responded to all other students at least once except for a few students (e.g. student 91). Bear in mind that this isn’t meant to be a measure of the total connections but rather to indicate how democratic they were in connecting to each other. The same 800 notes could have been developed through the functioning of several cliques, each focused on the notes of their fellow clique members. The resulting sociogram would not look as complete but instead would have clear connections between nodes, with clear hubs of activity. In the case of Zara’s class they appear to be interested in each other’s work with the density of the connectedness of the group at 68.57%.

The other measure that is noteworthy is the distribution of the students in Zara’s grade 3 class that were involved in writing rise above notes. Figure 17 shows the broad distribution of students who were involved in the writing of rise above notes. This was mostly due to the fact that the group co-authored many of the rise above notes. Even so, this again is an indication that Zara’s students were functioning as a Knowledge Building Community in terms of the principle of Community Knowledge, Collective Responsibility (#6).

An example of a rise above note is presented below (see Figure 18) and conveys student accounts regarding the relationship between the sun, the moon and the earth. A rise above “patch” was developed (see Figure 19) during study group meeting #2, a patch of color with text on top, placed directly on the surface of the view where students can place their rise above ideas. The study group reasoned that this represented a simple way to capture the power of the rise above note and at the same time make ideas more accessible to young students. The colored patch with text on top of it could be seen directly on the view, so students did not need to open a note to see the main ideas. According to the plan developed in the second study group meeting,
Zara wrote out ideas contained in notes and positioned the notes next to the statement on the colored patch (see Figure 19). As rise above notes were completed they were moved onto the patch so students would see the big picture of the ideas contained in the notes.

![Participation in rise above note writing](image.png)

*Figure 17. Zara’s class—All Ways of the Earth views: Distribution of reading showing student participation in the creation of rise above notes ranging from 1 (student 89) to 16 (student 98)*

The overall structure of the views for the “Ways of the Earth” work of these Grade 3 students is also noteworthy. The initial view for the study was titled “The Ways of the Earth”. There was no set question to pre-determine the content of the view (this is in contrast to the work at Site III, to be elaborated below). Students were encouraged to develop and elaborate their problems of understanding, rather than move directly to answering questions, and as problems of understanding and questions were elaborated new views were created, with links back to the main, top-level view, and notes related to these new areas of study were moved over to new views. The colored patches were later used to highlight knowledge advances by the group in each of the views. Figure 19 presents the rise above patch for the Sun the Moon and Earth view.
How does the moon, sun and the earth rotate together all at the same time?

These notes tell what we know about the earth, the sun, and the moon. We know that it takes 24 hours for the earth to spin around its centre. This causes day and night. It takes 1 month for the moon to go around the earth. The sun doesn’t move. It takes a year for the earth to go around the sun. This causes the seasons. Every time the earth turns a quarter around the sun it changes seasons.

Figure 18. Zara’s class--Example rise above note: This screen capture is of contents of the Rotation rise above note as it was on January 30, 2005

<table>
<thead>
<tr>
<th>Knowledge Advances</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sun shines on the moon. The moon doesn’t shine by itself. Sun shines on the moon</td>
</tr>
<tr>
<td>The moon is made of gravel and rock.</td>
</tr>
<tr>
<td>what the moon is made of</td>
</tr>
<tr>
<td>the earth is a planet.</td>
</tr>
<tr>
<td>the earth is a planet.</td>
</tr>
<tr>
<td>It takes 24 hours for the earth to spin around its centre. This causes day and night. It takes 1 month for the moon to go around the earth. The sun doesn’t move. It takes a year for the earth to go around the sun. This causes the seasons. Every time the earth turns a quarter around the sun it changes seasons.</td>
</tr>
<tr>
<td>Rotation</td>
</tr>
<tr>
<td>sun don't spin</td>
</tr>
</tbody>
</table>

Figure 19. Zara’s class--Rise above “Patch”: This screen capture represents the rise above patch for the Sun the Moon and the Earth view on January 30, 2005
Figure 20. Zara’s class—Ways of the Earth Rise Above view: This is a screen capture of this rise above view on January 30, 2005 and the simple grid that was used to organize the rise above notes from the research views.

Where appropriate, and as determined by the students in consultation with Zara, rise above notes were created to subsume the existing ideas and to highlight, “what we think we know”. Zara indicated that it was important that the students know that these ideas had been worked on sufficiently that they could be set aside but also that the students knew they could be worked on again if the students felt they had something to add. As a form of rise above to the patch rise above notes, a view was created to help organize the rise above note across all of the research views. The resulting rise above view (see Figure 20), entitled “The Ways of the Earth Rise Above View” brought together the main knowledge gains of the group.
Student perspectives - Zara

Each student who was interviewed from Zara’s class was able to clearly identify not only the focus of their own Knowledge Building Community work but most could also name the work that was being done by other members of the class. Again, these responses are provided for triangulation purposes in relationship to the teachers’ self-reporting of their classroom activities in the study group meetings and interviews.

Student responses to the following questions are reported below.

*What is important to know about the Knowledge Building Community model?*

“try(ing) to get as much knowledge out of what you are studying and being cooperative and try(ing) not to disagree in a mean way. Tell why you disagree or agree (and) try to stay on a topic as long as it lasts and be nice to each other about it and when you get the answer try to get another question” (student 93)

“The only way you can start writing notes is by reading notes, so that (is) pretty important” (student 100)

“To make (KBC) work you should try to put in new theories or questions or add information. That would get it all started with a question that would get bigger and bigger” (student 94)

“Knowledge Forum is a program that teachers use to look at kids’ thinking and learning” (student 105)

From the sample of students interviewed in Zara’s class there is a range of views about what is important to know about the Knowledge Building Communities model. This range extends from the software being a way for teachers to watch what kids are thinking to making sure that everyone is reading all of the notes and building on in a positive, not mean, way. There is also an indication from two of the students that there is a continuous growth aspect to the Knowledge Building Communities model. Student 93 indicates that you move on to a new question once the previous one is completed and student 94 suggests that questions that start with
theories and get added on to will get bigger and bigger. An important factor throughout is that the class is reading and communicating about what they are working on.

Who decides how Knowledge Building happens?

“We meet as a class. The class decides who they want to build onto. Once in a while we have a talk about how things are going” (student 94)

“All of us, all of us have ideas on ways to do it. We sort of do it our own way and I that might be better” (student 93)

“Not only Zara. Like if we were going to change something on the view we would all do it together, she doesn’t do stuff all alone. We all got on the carpet and she would put it on the screen and sometimes it would be so close we would have to have votes. It’s not her view it is all of our’s view” (student 100)

“My whole class does it together. When we have KB Talks we get to decide” (student 105)

It is clear that the students in collaboration with Zara negotiate how the Knowledge Building Community model is going to happen in Zara’s classroom. One strategy that was suggested, but is not clear from student comments, is that a data projector was used regularly to project the Knowledge Forum database onto the wall during “Knowledge Building Talks”. Zara had her own class data projector which made it possible to do this whenever she deemed necessary. Seeing their class work on the large screen appears to have helped them negotiate changes to the database. It is clear from student responses that they perceive themselves as having agency over the processes by which knowledge is being created in their Knowledge Building Community. This suggests this class is addressing the deeper elements of the principle of Epistemic Agency (#5).

What materials do you have in the classroom?

“Internet and books” (student 93)

“Books and websites” (student 100)
“Books” (student 94)

“Books, thoughts and Knowledge Building Talks” (student 105)

With respect to materials it is clear that Zara’s class has many books available for their inquiry. Student 105 also includes Knowledge Building Talks as a material suggesting that he sees their own ideas as integral to the resources used in their Knowledge Building work. Finally, the Internet is also suggested by two of the students as being something they use to support their work.

How do you know you are making progress?

“We go on a few days and look at the notes and if they don’t really fit we can ask the person to take it to a different section” (student 94)

“Zara normally decides if we are getting somewhere because she watches us on Knowledge Forum” (student 105)

“You can’t really just say if there is a lot of notes because some notes may just say no or yes or you’re right. So you have to read the notes and see like if they are yes or no or under our (curriculum) umbrella” (student 100)

No response (student 93)

For Zara’s grade 3 students this question was somewhat more difficult to answer. Most responded that it was reading and building on that indicated that they were making progress. Student 100 offers the insight that you cannot simply base your judgment on whether there are a lot of notes. This student goes on to say that they are probably making progress if they are addressing issues that are listed under their study “umbrella”. This suggests that the class has a community goal that they are working toward (Community Knowledge, Collective Responsibility – principle #6). However the idea that they would be reaching ever more advanced levels of knowledge is not mentioned by these students suggesting that although Zara
is seeing a connection to Embedded Transformative Assessment (#12) that they class has not yet brought that principle into their approach to the Knowledge Building Communities model.

**How should Knowledge Building end?**

“I don’t know, we are so worked up about this one. (Probably) us finding out all or most of our questions and we have learned a lot of it” (student 93)

“Like you could go on forever, there isn’t a point where you know everything” (student 100)

“If it ever does (end), because we still haven’t really got rid of the history view. But if we ever did end it, it would probably be that all the questions were answered” (student 94)

“When we think we’ve learned enough we think it is getting a bit boring” (student 105)

Two of the students indicated that their current study never needed to end. Student 100 stated that there isn’t a point when you know everything. The other sentiment that is expressed about how Knowledge Building should end is that the class should determine if they have answered the questions they set out to answer. Taken together the students who were interviewed indicated that the Knowledge Building Communities they were participating in was one where there was good levels of contributing and reading occurring, that there was a community concern for understanding the problems they were trying to understand and that they were very much involved in the decision making that was essential to the progress they were making in the study. Nonetheless, two students indicated that there are endpoints—when all questions are answered or the participants get bored.

**Summary - Zara**

The Knowledge Forum database work done by Zara’s class and the students responses during the interviews both support Zara’s claim that she had worked to change her approach to involving the Rise Above (#4) principle in her Knowledge Building Communities design. Her instantiation of the Rise Above (#4) principle was different from Rick’s, both in terms of the
number of students who were involved in the creation of rise above notes and in the variety of ways she went about having the class engage in the act of rising above their previous learning. Although Zara described the principle of rise above as a way of managing ideas on the view it also seems developmentally appropriate given that she was attempting to execute the creation of a Knowledge Building Community with grade 3 students. In her post interview Zara credited the study group meetings with both providing a context for the group to discuss ideas about how to implement the principles in the classroom design and also with providing time to reflect on the principles themselves.

Summary – Site I

The study group at Site I met just a few times during the fall term, however the influence of these meetings on their classroom practices and in turn on their perceived understanding of the Knowledge Building Communities model was clearly expressed by both teachers. Zara said in her post interview, “It was our decision to use it (Rise Above), in that way, that made me try it.” She went on to say there was something important about making this commitment during a face-to-face meeting. Analysis of the database and the student interviews support the finding that the practices reported by the teachers were occurring in the manner in which the teachers had indicated. However, upon closer inspection the intended goal of the Rise Above principle, that “rise-above notes and views support unlimited embedding of ideas in increasingly advanced structures, and support emergent rather than fixed goals” (Scardamalia, 2002) was only partially achieved. In both cases the teachers indicated that their use of the rise above notes was as a way to set aside knowledge (Zara) and as a way of managing the knowledge that was being developed in the “non-Knowledge Building” research views (Rick). Even so, it is compelling that the explicit focus that was placed on Rise Above (#4) led to legitimate advances with respect to two
other Knowledge Building Communities principles, namely Embedded Transformative Assessment (#10) and Idea Diversity (#3). This suggests that by framing the functioning of the study group around a specific Knowledge Building Communities principle, in this case the Rise Above principle (#4), and taking action on its implementation, benefits accrue with respect to making connections to other aspects of the Knowledge Building Communities model.

The profiles of the Knowledge Forum database activity that were developed through the use of the Analytic tools suggest that a well functioning Knowledge Building Communities should have all students making regular contributions to the Knowledge Forum database, with students being aware they have agency over the focus and content of their inquiry, and with reading levels that promote student awareness of the work being done by other students (e.g. $\geq 50\%$).

Site II

Overview

This portion of the report presents the case of the Site II study group as it relates to the proposition that: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. Overall the findings from this case study follow the replication logic (Yin, 2003, p.47) that asserts that researchers might find contrasting results in different contexts for predicable reasons. As outlined in chapter 2 the following issues affected the composition of the Site II study group: variations in the membership of the study group (e.g. meetings without all members present), timing and frequency of the meetings, changes in the curriculum topic and how they were being studied by the students (e.g. joint inquiry between classes, one period a week for some students). These variations created a contrasting context for this study group and
the findings from this case study informed subsequent work at Site III. Even with the difficulties and the concerns voiced by the Site II teachers regarding the limitations of the Knowledge Building Communities model at Site II both Don and Wendy reported gains in both their perceived understanding and appreciation for the model as a whole and several of the Knowledge Building Communities principles in particular. These findings are taken up in the sections to follow.

The work at Site II can be broken up into three periods of activity that map onto the seasons: fall, winter and spring. In the fall of 2004, Tanya taught her own class while Don was to teach both Wendy and Tanya’s classes about robotics by using Lego robotics equipment in combination with using Knowledge Forum to discuss the students’ designs and computer programs. Although Don had intended to work with both classes on this topic he ended up only working with Tanya’s class. Tanya herself had two areas of focus for her class, both of which were directly in line with her planned curriculum. These topics were setup in the database as the “Energy and the Environment” view and the “Racism” view. Don found the topic of robotics difficult to articulate with the idea-centered approach recommended by the Knowledge Building Communities principles; however, he did continue with this study part way into the winter term. In the winter term, after Tanya had left the school and had Wendy come into the study, the study group was essentially reset as being composed of Wendy, Don and myself as the university researcher/participant-observer. Wendy’s initial Knowledge Building topic was also directly associated with her planned curriculum. Wendy created a view called “Bright Ideas!” where the students addressed questions related to the science topics of energy and electricity.

The initial plan was to hold regular bi-weekly study group meetings, Friday’s at lunch hour. Meetings were to extend from January (conjecture meeting) to June (retrospective
meeting). A Knowledge Forum database view was to be used for the study group to communicate between the meetings. For the purposes of this report I focus on a subset of five of the twelve Site II study group meetings as not all meetings were recorded. Where recordings were not available notes entered into the database were reviewed to determine what happened at these meetings. During the January conjecture meeting (counted as meeting #1) the study group discussed and identified three Knowledge Building Communities principles that they felt needed to be the focus of their work. These Knowledge Building Communities principles were: Improvable Ideas (#2); Constructive Uses of Authoritative Sources (#10); and Knowledge Building Discourse (#11). The first principle was identified because there were concerns expressed by both Don and Wendy that the students did not, and perhaps could not; see their own ideas as improvable. During this meeting the study group also discussed the idea that they might need to create displays in the classroom to support the students in seeing their ideas as improvable. In reality this never occurred. The suggested focus on authoritative sources was also prompted by a concern expressed during this initial meeting about the students’ ability to read, as many of the students had English as a Second Language (ESL) identifications. It is important to note that this interpretation of the principle is a more basic form of the Knowledge Building Communities principle of Constructive Uses of Authoritative Source (#10). This principle is intended to promote students taking a critical stance on the material that they are reading. Both Don and Wendy agreed that the use of leveled reading materials ¹ might help their students. Finally, the idea to focus on Knowledge Building Discourse (#11) was prompted by me in response to Wendy’s suggestion that the learning of new things required a great deal of classroom discussion. I noted the connection to the Knowledge Building Discourse principle

¹ Leveled material in the form of content-related reading materials appropriate for the reading level of the students at a particular grade level.
and that they might be able to use classroom discussions to help students see their ideas as improvable.

The group agreed to use the Knowledge Forum database to communicate between meetings. Unlike the Site I study group, the Site II study group used the Knowledge Forum database to communicate with each other during a six week period from the initial January meeting through to roughly the end of the winter term. The pattern of this on-line discourse is taken up in a later section of this report. The specific content of this on-line communication centered on Wendy’s concern about how to interact with her students, basically she wondered about her role and how much she should be influencing the questions that the students were going to pursue. She also voiced concern about how best to start the entire inquiry. There were two branches to the conversation that came out of her initial note. On one branch I tried to relate her question back to the three focal principles of Improvable Ideas (#2), Constructive Uses of Authoritative Sources (#10) and Knowledge Building Discourse (#11). My overall intention was to convey the importance of finding a way to allow students to find the questions that were of value to both themselves and to the other members of the class. Don’s contribution to this conversation was more reflective. He noted how this was a different way of teaching for Wendy. Don wrote:

It is interesting how use of Knowledge Building Communities principles and Knowledge Forum drives or shapes the discussions face-to-face in the class in a different way, and in the focus of how the topic is “covered”. Would you be having this type of discussion with your class if you weren’t using Knowledge Forum with them? Is it accurate to say that it also changes the focus of the unit into understanding ideas and sharing them as opposed to focusing on tasks?

(Don – Database entry January 30th, 2005)

To which Wendy replied:

I totally agree with you Don! Though it is difficult to admit, I often find myself trying to cover content in my classroom rather than to help my students develop ideas. I think that
Knowledge Forum will change the shape of our unit. It will also make the things we learn more meaningful as the kids can use their learning to respond to our online discussion rather than just copy it down in their notebooks or on a question sheet. I am excited to see how this develops.

(Wendy – Database entry January 31st, 2005)

The spirit of these two notes, that big changes were going to happen, persisted throughout the remaining set of notes in this thread. In the other branch of the conversation Don wondered how he should approach his work with Tanya’s class. I suggested that he determine what was going to be the main focus for the class and stick with that as the central concern for the students. Off of the database Wendy and Don had a discussion and they decided that it would be advantageous to have the two classes work together on and off of the database. At the beginning of February Wendy and Don reported that they were making a shift in focus to bring the two classes (Wendy’s class and Tanya/Don’s class) together to address a common topic, racism. This decision was made because both teachers felt it would be helpful if they could work together on the same topic for professional development and support reasons. This move was also based on the perception that there was strong student interest in the topic as it built onto the work that had already been started by Tanya/Don’s class in the “Racism” view.

In February, to support the need for more time to collaborate, the principal at Site II shifted the timetable to allow Wendy and Don to meet regularly to plan what they were going to do with their students. The time that was made available by the principal for these meetings was Friday morning just before the classes came together to work on their joint racism study. Unfortunately this was a time when I (the university researcher) was not available to attend. The teachers were encouraged to go ahead with their meetings but both were provided with voice-recorders given that these meetings would be going forward in the absence of anyone, beyond themselves, who might bring the Knowledge Building Communities principles into the
conversation. Ultimately, these Friday morning meetings were rarely recorded as it was reported to be hectic and the teachers were focused on getting ready for the group time to follow. During the retrospective meeting Don reflected on the choice of Friday morning as the class meeting time and also the nature of the library space.

Don: Friday morning was so difficult. We had many constraints on us, one of the main, lab time scheduled, because we were trying to enter in on that when the schedule had already been set, and then there was the scheduling, and the library was always noisy and we couldn’t really find a day that was perfect, just because of the way it is in the library. (Site II - Retrospective meeting, June 23rd, 2005)

During my visit on February 18th I was asked to become involved in the creation of some new views to go along with the joint inquiry on racism. The initial Racism view was renamed Racism and Discrimination to fit more with what the students were discussing and several new Knowledge Forum views were created including: Slavery; Skin Colour; and Culture. During this session I found myself stressing to the teachers and to the students that they should view their ideas as improvable (principle #2 Improvable Ideas), that they needed to determine how they might make a contribution to the community (principle #6 Community Knowledge, Collective Responsibility) and also that everyone should feel that they can make a positive contribution to the study (principle #7 Democratizing Knowledge).

During the next full face-to-face study group meeting held on March 16th the discussion revolved around the Racism and Discrimination view and how to move it forward. The principle of Rise Above (#5) was discussed and a rise above note was started by Don. The study group also discussed the use of rise above in other schools. There was discussion about the principle of Real Ideas, Authentic Problems (#1) and the principle of Epistemic Agency (#5) in terms of helping students to participate in the knowledge work going on in the Knowledge Forum database. There was further conversation about rise above, both from the technical making of this type of note and the concept of summarization, that is, doing justice to the ideas being risen above and setting up a new place from which to build on. The meeting ended with both teachers looking forward to getting back to the racism and discrimination study after the break. Both teachers committed to getting more leveled readings together for the students to use. Don committed to take the lead on developing these resources.
After the spring break the two classes continued to work together, Friday mornings, with opportunities for students to go on the database as a choice activity spread across the intervening days. During the whole group meetings Friday mornings the teachers had the students reading the materials they had prepared. Wendy’s class became focused on the culture view as they connected this view with the curriculum work they were doing about cultures around the world. Unfortunately there were again multi-week gaps between fully attended study group meetings. It was at the end of April that Don wrote a note in Knowledge Forum about an insight he had gained from their attempts to advance the design of the Knowledge Building Communities model at Site II early in the spring term. He wrote:

After several weekly sessions I feel I have moved forward in my understanding of what Knowledge Building looks like in our school. To continue further, Wendy and I discussed today that Knowledge Building would have to be a primary focus of a classroom teacher from day one, with structures set in place in the classroom to develop Knowledge Building Communities principles such as discussion groups, visual displays, and introductory topics to get the ball rolling. The racism view is beginning to generate some useful discussion. Even there we have had more time spent off computer than working in the database over the last few weeks. There has been some connection to the study of ancient civilizations, but just a bit. I am hopeful that we can continue to move forward. The next logical step has got to be integration into the classroom program. Without that we end up with a weekly session as opposed to something that changes the teaching and learning environment in a bigger way.

(Don - Database entry, April 27th, 2005)

In retrospect I should have taken this insight as an indication that the teachers were losing their desire to continue with the implementation. Instead I repeatedly asked if we could take the intervention in the other direction, towards putting more time for Knowledge Building into their schedules. It was at this point that the only recorded meeting between the two teachers occurred. The transcript of this meeting reveals that Wendy and Don didn’t discuss any of the Knowledge Building Communities principles but instead focused on concerns about students’ abilities to think about ideas and the feeling that they would need more time to plan if they were to become
more focused on Knowledge Building throughout their schedule. One episode from this meeting was analyzed and is presented in a later section of this report. Ultimately, no focused period of Knowledge Building was attempted and the racism and discrimination study limped to closure in May with the teachers encountering technical difficulties with the school’s aging laptops as they attempted to get more students on the computers during the Friday morning time slot.

Upon my arrival at the school on June 3rd I found that Wendy had abruptly shifted to using Knowledge Forum for her math program. Again, this was surprising because there had been discussion in the previous study group meeting about how Don and Wendy would try to arrange time such that they could get the two classes to focus more intensely on Knowledge Building for a one to two week period. Wendy’s decision was arrived at during one of the teacher-only planning meetings that hadn’t been recorded. Interview data and a posting in the Knowledge Forum database by Wendy suggest that she made this decision based on her perceptions about how the students had been working in the racism and discrimination views and specifically how she felt some of the students seemed “disconnected” from the inquiry. Moving to math, Wendy reported, was her attempt to allow all members of the class to participate. It was also a topic she was more comfortable with and was something that she felt all of her students could understand. In Knowledge Building terms, without explicitly referencing it, Wendy had taken action to promote the principle of Democratizing Knowledge (#7) in her classroom. The results of her intervention are presented later in the student database activity section of her embedded teacher case study. What follows are case reports about the changes that occurred for Wendy and Don respectively as a result of participating in a study group focused on the implementation of the Knowledge Building Communities model. Table 6 outlines the changes that Wendy and Don self-reported as a consequence of being part of the study group.
Table 6.

**Knowledge of KBC principles and study group meeting focus on KBC principles – Site II**

<table>
<thead>
<tr>
<th>Principle discussed explicitly during the analyzed meetings (frequency)</th>
<th>Reported change in knowledge and/or importance of the principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>* indicates principle was identified as a group focus at the beginning of the series of meetings</td>
<td>--- indicates no change</td>
</tr>
<tr>
<td>** indicates that at the end of the meetings the participant identified the principle as having been a focus</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Wendy</th>
<th>Don</th>
<th>Tanya</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Real Ideas, Authentic Problems</td>
<td>Yes(3)</td>
<td>UP**</td>
<td>---**</td>
</tr>
<tr>
<td>(Identified connection to Knowledge Building Discourse)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>2. Improvable Ideas</td>
<td>Yes(5)*</td>
<td>UP**</td>
<td>---**</td>
</tr>
<tr>
<td>(Identified connection to Rise Above)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>3. Idea Diversity</td>
<td>No(0)</td>
<td>UP</td>
<td>---</td>
</tr>
<tr>
<td>(Identified connection to Idea Diversity)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>4. Rise Above</td>
<td>Yes(10)</td>
<td>UP**</td>
<td>UP**</td>
</tr>
<tr>
<td>(Identified connection to Idea Diversity)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>5. Epistemic Agency</td>
<td>Yes(4)</td>
<td>No knowledge</td>
<td>UP</td>
</tr>
<tr>
<td>(Identified connection to Pervasive Knowledge Building)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>6. Community Knowledge, Collective Responsibility</td>
<td>No(0)</td>
<td>UP</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>7. Democratizing Knowledge</td>
<td>Yes(1)</td>
<td>UP</td>
<td>---**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>8. Symmetric Knowledge Advancement</td>
<td>No(0)</td>
<td>No knowledge</td>
<td>UP</td>
</tr>
<tr>
<td>(Identified connection to Epistemic Agency)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>9. Pervasive Knowledge Building</td>
<td>Yes(1)</td>
<td>---</td>
<td>UP</td>
</tr>
<tr>
<td>(Identified connection to Epistemic Agency)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>10. Constructive Uses of Authoritative Sources</td>
<td>Yes(4)*</td>
<td>UP**</td>
<td>UP**</td>
</tr>
<tr>
<td>(Realized her communication style not in keeping with Knowledge Building Discourse)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>11. Knowledge Building Discourse (KBD)</td>
<td>Yes(4)*</td>
<td>DOWN</td>
<td>UP**</td>
</tr>
<tr>
<td>(Identified connection to Real Ideas, Authentic Problems and many other principles)</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>12. Embedded and Transformative Assessment</td>
<td>No(0)</td>
<td>UP</td>
<td>UP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NA</td>
</tr>
</tbody>
</table>
Figure 21: Site II study group – Total references to principles during meetings. Range 0 references (meeting #12) to 18 references (meeting #1).

Figure 22: Site II study group – Distribution of references to principles during the meetings. Range 0 references (various) to 8 references to Rise Above principle (#4) in meeting #5.
Figure 21 gives an overview of the frequency of explicit references to the Knowledge Building Communities principles during the first, fifth, ninth and twelfth whole group meetings and also includes the database discussion held in January and February. The clear and consistent reduction in references to the Knowledge Building Communities principles over the course of the study group meeting period can be seen in this graph. Not shown on the graph, but in-line with this movement is the meeting between Don and Wendy on May 20th during which there were also no references to the Knowledge Building Communities principles. The twelfth study group meeting, held on June 3rd didn’t include any references to the Knowledge Building Communities principles as the bulk of the meeting was spent discussing Wendy’s decision to move her class into using the Knowledge Forum database for mathematics. What is clear is that the teachers had concerns about their students’ abilities to participate in a Knowledge Building Community, concerns about the curriculum and concerns about how the Knowledge Building Communities model fit into their school. During the winter portion of our working together Wendy and Don were able to make advances on having their students participate in the racism and discrimination study and the culture study by focusing on the provision of leveled readings and the holding of group discussions about the key concepts. However, in the spring they clearly came to a point where Wendy and Don felt they weren’t moving their students to deeper levels as they were observing that some students were disconnected from the inquiry. Wendy’s move to focus on mathematics, and more precisely mathematics word problems on Knowledge Forum, was because she viewed it as something that all of her students would understand. This appears to represent her attempt to reconcile all of the issues she and Don had been dealing with but it ran counter to many of the other Knowledge Building Communities principles that the study group had been working with during the previous six months. Most notably both Don and
Wendy viewed the move to mathematics word problems as being within the scope of the Real Ideas, Authentic Problems principle (#1).

A chance discussion with a student during my visit on June 3rd suggested that the students could see that the mathematics use was not in keeping with the goals of the Knowledge Building Communities model that they had been trying to pursue with the racism and discrimination study. The student indicated that she could see how this curriculum topic could be done more as Knowledge Building. This conversation is presented in full at the end of Wendy’s embedded case study. Don felt that what Wendy had moved to doing with her students, around solving mathematics problems using Knowledge Forum was more appropriate in terms of both the students and also in terms of moving toward the Knowledge Building Communities model.

That’s true too, because the social studies unit that we would (normally) do would be very much task-oriented, and pretty much transmissive, and there’s some activities and art and things but it’s very much teacher-directed. (I)n the math side, I’m just listening to some of the things that Wendy’s doing with the kids, and that is more, not cutting edge, but more of a Knowledge Building approach to teaching, and she has it shown and they’re articulating and sharing ideas, she’s getting them to explain their understanding. And they’re not doing just…rote kind of work, so it’s partly where we are in terms of teaching.

(Don - Site II - Retrospective meeting, June 23rd, 2005)

In one of the later group meetings Wendy stated that based on her experiences of trying to implement the Knowledge Building Communities model in her classroom she could see how it could work in the future in her teaching.

I think with the software, and just the whole approach of Knowledge Building, I see that it’s more feasible, that there’s a way to have this in the room, or have this develop. I see a way rather than, “that would be nice to do.”

(Site II – Study group meeting #9, May 13th, 2005)

Wendy’s view of what the study group was all about had also changed over the six months. At first she had expected that it would be mostly about getting trained in how to use the software and hearing how others had implemented the Knowledge Building Communities in
their local contexts. By the end of the study group meetings she viewed the study group as more a forum for research.

It kind of makes me think, kind of like action research, we’re going through it and as we’re trying something out, experimenting with Knowledge Building, it’s starting to change the way we do things, and it’s our whole approach to teaching.

(Wendy - Post interview, June 2005)

In her pre-interview Wendy had likened the activities of the study group to being about the implementation of the Knowledge Building Communities model while in the post interview she moved to it being about experimenting and changing "the way we do things." In her post interview Wendy discussed the value of participating in a study group in the following way:

It was great, because it was so specific to my room. And our issues, and not just our issues, but one particular kid, like when that child said this was boring, it was great, it was so specific, and even in terms of dialogue. We get to talk, Don and I were talking constantly, and usually we talked about which page to do in math but talking about different things and our practices as teachers (in the study group), there’s no time for that, and this kind of forced us.

(Wendy - Post interview, June 2005)

For Wendy it was not just that she got to discuss general approaches to her classroom but also very specific issues and practices, and although she suggested that it was her discussions with Don that were important she concedes that she wouldn't have had time for them unless she had been involved in this study group. Wendy, in her post interview, expressed that she felt the Knowledge Building Communities principles were part of the group’s monthly discussions but that she hadn’t been thinking about them except when I raised them during the meetings.

You (UR) pushed them more than I was thinking about them, you brought them up and you kept relating back to (them), and kind of making me try to make those connections but I wasn’t naturally just thinking of those principles at all.

(Wendy - Post interview, June 2005)

In reflecting on whether she could do this next year without a university researcher as part of a study group Wendy stated that she would need to spend more time looking at the
Knowledge Building Communities principles because she wouldn't have someone there relating
the discussion back to aspects of the theory.

Well, I guess just from our discussion, like the last interview when I was looking at them
(the Knowledge Building Communities principles) again because I hadn’t looked at them
in a long time. I actually thought I should have been thinking about this stuff more so I
could say that next year I would go back to it, because without you there reminding me
then I could easily go off and kind of leave that (the Knowledge Building Communities
principles) behind, so I think I would definitely want to go back because I couldn’t have
(a) university researcher there telling me and reminding me.

(Wendy - Post interview, June 2005)

It is clear from this statement that the Knowledge Building Communities principles were not part
of Wendy’s day-to-day thinking as it related to what she was going to do with her students in
terms of the Knowledge Building in her classroom. However, through the experience of
participating in the study group and attempting to implement the Knowledge Building
Communities model in her classroom Wendy came to realize that the Knowledge Building
Communities principles may be something important to pay attention to in the future. I suggest
that this realization is part of finding one’s entry point into the deeper levels of the Knowledge
Building Communities model that extends beyond the surface level of simply using the software
to read and write about ideas.

As far as the time that Wendy and Don had been given to meet during school it was clear
that they tended to use this time to discuss what they were going to do with the students in the
up-coming period and not to explicitly discuss the Knowledge Building Communities principles
or how they were changing their teaching practices.

A lot of how that time was spent, the eight-thirty to nine was spent preparing for the nine
to ten (o’clock) teaching time, because we didn’t have time to collaborate together
otherwise. And it was rushed and it was, hey what are we going to do, and then there’s
that singing, and then they’re looking for us because we’re in the library, and Don’s the
librarian.

(Wendy - Post interview, June 2005)
Essentially, the bi-weekly study group meetings gave way to more typical teacher-to-teacher interactions during the Friday planning meetings. The role the Knowledge Building Communities principles in these meetings is taken up later, but as we can see from Wendy’s account, the focus shifted to planning activities that the students would engage in during the upcoming period. Wendy doesn’t mention anything about the Knowledge Building Communities principles being discussed or referenced. Analysis of one of these teacher-to-teacher planning meetings indicates that there were no references to the Knowledge Building Communities principles during the meeting held on May 20th, 2005.

In terms of the proposition the Site II case study offers contrasting results but for predictable reasons. The classroom implementation and the teachers’ self-reported understanding of the Knowledge Building Communities model both appear to have been affected by the study group’s inconsistent focus on the Knowledge Building Communities principles as a response to the contextual concerns that were being raised by the teachers. In addition, the apparent lack of focus on working with the principles led to a lethal mutation of the Knowledge Building Communities model at Site II based on the perception that the implementation was not benefiting enough of the students. What follows are the embedded case studies for Don and Wendy respectively to probe more deeply their perceived understanding of the Knowledge Building Communities model and their implementation in the classroom.

**Embedded teacher case study - Don**

*Background*

At the beginning of the study Don expressed concern about the progress that had been made the first year that teachers at Site II had used Knowledge Forum in their classrooms. Don summarized the issue in his pre-interview.
I think people felt as if they had made some progress but that it wasn’t substantial enough to really say, ok…this was…I mean, you could see the potential but then it was, how valuable is this in terms of use of time? Like, we still look at this, we’re covering this topic area, however well it’s done, the teachers have to go through it, and was the work with Knowledge Building fitting into that context as opposed to the other way around? Which is, I guess, maybe the way it should be. So we ran into some technological hurdles, we read through the manual a couple times, we tried to find help, and eventually…time marches on and we couldn’t get anything further with it.

(Don – Pre-interview, October 2004)

Don points both to the need for coverage of the curriculum and also to the question of whether the Knowledge Building Communities model should be fitting into the local context or the other way around. In other words, the teacher might need to change something significant to help make the model work in his or her setting. Don also reflected on how the Knowledge Forum manual, for learning how to use the software, and all of the articles he had read about Knowledge Building hadn’t been any help to him in terms of how to use Knowledge Forum to make Knowledge Building happen in his classroom.

You know, it was just all these pages that had the same value to them whereas if we had the time we would have been able to pull more out. I mean, I’ve gone through the manual but a lot of it is like, what do you do with kids? To see that directly and how you manage the ideas and the discourse or how you deal with stuff once it’s there in your group discussions and that kind of thing.

…like I said, millions of articles, and I still don’t know how to do it. So it’s kind of like you gotta walk the walk, I guess, and talk the talk too.

(Don – Pre-interview, October 2004)

Also during Don’s pre-interview he stated that the previous attempts at doing Knowledge Building had met with limited success. He felt that something needed to change to be more successful this time around.

Well, yeah, because we’ve already failed, so if we do the same thing again we’re going to fail again. We have to change something.

(Don – Pre-interview, October 2004)
In his pre-interview Don also shared that he had only once experienced teaching something from first principles – Tae Chi. He did expect that he would be able to use the Knowledge Building Communities principles to implement Knowledge Building properly. In his pre-interview Don professed admiration for the theory.

Because the theory is very exciting. The theory is lovely.

(Don – Pre-interview, October 2004)

Given the contextual concerns that were raised by Wendy and Don, about students’ abilities to write and read in the Knowledge Forum software, it is interesting to see that Don initially marked these two activities as a primary benefit of participating in a Knowledge Building community for the students.

Oh, for the kids? Well, it’s going to extend their learning. It’s going to extend their understanding of what we’re doing. Hopefully in terms of literacy, there’s also some hopeful gains to be made there too. They’re going to be reading and writing. So they’ll be expressing themselves and communicating. So that’s the major need of our student population.

(Don – Teacher pre-interview, October 2004)

In his pre-interview Don also stated the basic concern of learning scientists about the scalability of their innovations. He was skeptical and felt that the Knowledge Building Communities model might be too complicated to actually be applicable in most settings beyond where it was developed. Don was aware of Site I and the successes that had been gained there, partly through myself, but also because he had a niece that attended the school and had used Knowledge Forum.

Is this replicable, (or) can it be duplicated in this environment? Well, does it work? I mean, we’ve had exposure to technology and we’re pretty capable teachers otherwise, so how does that rubber hit the road there? How does that go? And if it’s too complicated and too difficult then does this apply to 95 percent of the situations or are you dependent upon particular environment, particular kind of students, all sorts of time and support and so on. So I’m curious about that.

(Don – Teacher pre-interview, October 2004)
Don’s prior experience with the theory was through his taking of two Master’s of Education courses three years earlier. He felt that he had read many articles but that he had not come away with a sense that he knew how to make this happen in his classroom. One article does appear to have made a significant impact on him in terms of pointing the difference between a task-oriented classroom and an ideas-centered classroom.

I’ve probably read like forty articles on Knowledge Building. I probably have some of them printed out in here, oh yeah…one article, that also Tanya found very instructive, was a focus on understanding versus a focus on tasks, I forget who wrote that one. But that was kind of interesting, that whole view of school being a series of tasks that kids have to jump through whereas the effectual understanding of what those tasks are about seem secondary. That one was really interesting.

(Don – Pre-interview, October 2004)

As a result of these course experiences Don had encouraged his school to buy the software that allowed him to use it with classes in his role as computer teacher in his school. Finally, the year prior to this study Don had taught an Additional Qualifications Course on Computers in the Classroom and three of his colleagues had taken the course and chosen to do their course project on an aspect of the implementation of Knowledge Forum. These angles on Knowledge Building included gender, English as a Second Language and Knowledge Building in science.

So they all had different focus to their work…part of my work was kind of trying to help them, and then at the same time I had some limited work with my own class, and I thought what I did what was probably the worst of all of it. I kind of had this huge mess and I didn’t know what to do with it.

(Don – Pre-interview, October 2004)

It was specifically the huge mess of notes, and the belief that if they could learn to use the rise above note, then they would be able to be more successful this time around, hopefully avoiding the paralysis that came with this messy-view problem. This was one of the main reasons Wendy and Don agreed to be part of this study and forms the bulk of what was covered in the second study group meeting at Site II.
**Contextual Concerns**

Don had a concern about student reading and writing but he also saw this as one of the goals of using the Knowledge Forum database with the students. He felt that since there were so many English as a Second Language and special education students in the classes that the focus on reading and writing would be well positioned. He framed this concern in terms of how much assistance these students would require.

I have a few hesitations about some kids who…having a significant group of kids…you’d have a lot getting special ed assistance and we do have a fair number anyway. How will they take with it? Or how much additional support will they need? Or will it take off with them and they’ll grow with it? I’m wondering about that.

(Don – Pre-interview, October 2004)

In his pre-interview Don also spoke about his feelings with respect to the curriculum as an issue to be addressed.

There is a very defined curriculum (here at Site II). Sometimes in science you have more wiggle room, but in math it’s kind of like, there’s more there. The number of expectations in each strand, there’s a lot of them. So when I talked about that march on through the program, you kind (of), you gotta keep going.

(Don – Pre-interview, October 2004)

Related to the curriculum concern is a concern for teacher proficiency with the content area. Both Don and Wendy agreed that this appeared to be an important contextual issue. For their part both teachers in the Site II study group were more comfortable with the content area of math than they were with social science or science.

WENDY: I think it’s because we know how…we’re proficient with that (math), we’re comfortable with it, we can let them—

DON: We know the math curriculum—

WENDY: We know it, but with the culture, like I was saying before, on a level like that I haven’t taught, I haven’t taught the kids that concept (racism) in that way, or those concepts and so I think a lot of us, we were just talking about how to explain that stuff to them, how to, it wasn’t something familiar to us, but if it was something that we were kind of “experts” in then we could play with it.

(Site II - Retrospective study group meeting, June 23rd, 2005)

Don also pointed out that the Knowledge Building Communities model might be more
appropriate for some students than other students but also acknowledged that ideally the
Knowledge Building Communities model should apply to all of the students in the class not just
the capable students. However on at least two occasions Don stated that it would be interesting
to see how the Knowledge Building Communities model would work for the variety of children
that they have in the classrooms.

You know, it’s like they can, and the kids in that class there’s a fair number of, and again
you don’t just limit this to your capable kids, but there are kids there who show a lot of
interest, and who kind of, ideas will stimulate others, they’ll be “good” at Knowledge
Building….Well, some of them, you always look at your very bright kids, oh yeah,
they’re going to have lots to say, they’re going to have a lot of ideas, they’re going to
share them with each other, and depending on how well my own abilities, I think they’ll
take to it very well. And so, on the other side, your behavioural kids, so forth, English as
a Second Language and Special Education students, you know, how will that go?

(Don – Pre-interview, October 2004)

Experimentation/Problem solving

Don experimented with several aspects of his classroom design, the most notable being
the curriculum topic being studied by the students. He went from having the students share their
robotics designs on Knowledge Forum to pursuing questions about racism and world cultures.
When the two classes joined together to address racism and discrimination Don then also became
involved in the experiments that Wendy was engaged with in her classroom. These experiments
included pairing up students to write together, making Powerpoint presentations about difficult
vocabulary, and in particular the inclusion of more readings for the students to learn about the
topics being studied. These leveled readings were used during the racism and discrimination
study to assist students in learning about cultures around the world.

With respect to the pairing of students Don reported that he and Wendy had tried this to
promote students taking some responsibility over one part of the topic.

Well, we did actually for a while (we had) them in groups, and so they were jointly
authoring notes and there was a little bit more, although it was smaller communities, but
they were actually sharing their ideas with each other and that seemed to be very effective.

(Don – Post interview, June 2005)

In essence all of the problems that Don took on, except for the topic of study, were focused on the surface features of Knowledge Building. The curriculum topic was a stretch for both teachers and may well be suggestive of why they only gave this study a one-hour block on a Friday morning. Each of the other problems that they experimented with focused on raising the level of participation of the students in the on-going discourse. However, Don didn’t describe these as being focused on the ideas that the students were seeking to advance, but instead that he was more focused on increasing participation in writing and reading with one another. Given that the principle of Improvable Ideas (#2) was to be a focus of the study group this suggests a failure of this study group in terms of framing the work of the teachers around the focal principles.

Teacher change

Don’s focus on the curriculum as a rigid element in his thinking about how the Knowledge Building Communities model could find its way into his classroom was stable throughout the period of time that the study group met. Even in the retrospective meeting Don was adamant that the curriculum was an “authentic problem”, as he put it, for teachers.

An authentic problem, as far as teachers go, is curriculum related. Like for our world, authentic is, okay we’re covering stuff that we have to cover. Regardless if whether the curriculum has to do with anything authentic at all. We have to do it and that’s authentic. For the kids, then we can find ways to motivate them and interest them whether it has any meaning outside these four walls or not. We can just get them interested.

(Site II – Retrospective study group meeting, June 23rd, 2005)

Don admitted midway through the period of time he was involved in this study group that he was just realizing how important the work going on off of the computer was to a Knowledge Building Communities model. This changed attitude towards the role of the off-line activity was most prevalent during the time that Don was focused on having the students create rise above
notes which was just after the fifth meeting of the study group when the Rise Above principle (#4) had been a focus of the meeting. Below Don describes how the creation of rise above notes had required his class to talk more off of the computers so that they could understand what had been done on the computers.

Because what I’m finding over the last few weeks is that my initial understanding of the use of, the application of Knowledge Building was that Knowledge Forum was sort of the main focus. And in actual fact my whole shift is that maybe it’s not, and that it’s almost, it supports it and that’s where the database is that houses the notes, but that most of it is not happening there, which is kind of common sense in a way, when you think about it because of course, it’s what’s supposed to happening within your class and not simply (in the database), I kind of knew that, but now I really see, it’s all the discussion and all the other work outside of that. And the actual notes and views and so forth, it’s not the tip of the iceberg but it’s kind of like twenty-eighty or something, and that is, I think, also a change in thinking too, and that’s really been more from when we started to, I think that occurred because previously, it’s funny, we’re having discussion, maybe you set them up in the classroom, come in, fill out the view, in a class or two and then that’s it. But then when you rise above something and you have new information, you’re trying to push the limits a bit, you need to talk about that. So you know, that was, when you’re going somewhere, I guess you’ve got to start talking about things a bit more. So that’s why I found that in the view, because we’ve risen above and moved forward to a certain extent then the discussions have been more focused and directed and that’s where I kind of feel like, you know, yeah, this is where it’s really happening. We have to organize so that the kids could access the database now, because we spent more time, we’ve kind of gone from spending a lot of time creating a cluttered view now to spending more time not even going there at all.

(Site II – Study group meeting, April 22nd, 2005)

Even with this insight about the design of the off-computer aspects of the Knowledge Building Communities Don struggled with the feeling that the reality of the Knowledge Building Communities model in practice was less impressive than he had expected. According to Don the reality of the classroom was a great impediment to the successful implementation of the Knowledge Building Communities model. He stated in his post interview.

There’s certainly, I find that the theory, in a way, it’s almost, because where the rubber hits the road it gets a little ugly, you know, the theory is much more attractive than actual reality, you know gee it sounds so good and then you see kids trying to (do it).

(Don – Post interview, June 2005)
Don was clear that the experiences he had trying to implement the Knowledge Building Communities model in the classroom was one of the main influences on his thinking about the Knowledge Building Communities model. Don reflected in his post interview about why his knowledge of the theory had changed.

I would say it’s our experience over the time. We’ve had...we’ve been focused on it and Wendy and I have gone back and forth, tried to figure out how to do this, and then we’ve had questions and we’ve had issues and we’ve been able to talk to you and got input—how do you do this? Try this. We’ve had lots of input from you as well. It’s been like Professional Development really. You’ve been there when we needed you to be, either virtually or face to face. So that’s good.

(Don – Teacher post interview, June 2005)

Despite Don’s assertion about the importance of my presence, the dominant influences on Don’s perceived understanding of the Knowledge Building Communities model came through his discussions with Wendy and his experiences of seeing students trying to successfully implement the Knowledge Building Communities model. In his post interview Don indicated that he saw a connection between the principles of Real Ideas Authentic Problems (#1), Knowledge Building Discourse (#11) and Constructive Uses of Authoritative Sources (#10).

UR: And how would you get more real ideas, authentic problems in next year?
DON: Knowledge Building Discourse and Authoritative Sources, and structuring the classroom with more visuals, actually building it into your wall, having some of those abstract principles represented in a concrete way, just like you try to show with math manipulative things, like in your library, you have little areas with things.

(Don – Post interview, June 2005)

However the connection Don described was, as he says, structural. His focus was still on the surface features that are needed to make the Knowledge Building Community happen in the classroom and not on the function of the principles within the Knowledge Building Communities model. In his post interview Don stated that the Knowledge Building Discourse principle (#11), depending on the context, can take many forms.

Now there’s some technical dynamics, but also just maybe some techniques or almost
devices to use to promote the discourse. And then that’s different in every class, you know, the knowledge building circle, or different common practices so still there’s more to know about that, but that seemed to be a really important part of the puzzle.

(Don – Post interview, June 2005)

Part of the issue with Don’s focus being on the surface level of the principles appears to have been his perception about the focus of the study group itself. When asked if he felt the principles had been a focus of the group meetings, he stated that he felt the focus of the meetings had been on the content of the students’ work.

The focus was on the implementation with keeping in mind different principles. We weren’t kind of saying, well, that’s this, how are we going to do the democracy thing, they (the principles) were there but we were really looking at it practically. Look at all these notes, reading the notes, and examining them.

Well, we were planning and discussing how we were going to implement Knowledge Building in our school and it was kind of a dynamic process that didn’t start with fixed study, that didn’t change the road. It kind of evolved over time and when you’re doing Knowledge Building it kind of has to, I suppose. So that’s my take on it, that we were looking how to design the best approach to implementing Knowledge Building in the school and that was ongoing.

(Don – Post interview, June 2005)

Don did concede that there was at times a focus on the principles and that this did serve an important role not just during the study group meetings but also as he was working with the students. Again this seemed to occur around the time of the second meeting that was about the Rise Above principle (#4). He stated the following in his post interview.

I did have a sense that as we were starting to rise above and move forward, that the principles were kind of the way forward. I’d had a number of experiences where I just stopped, and so that I knew what an unsuccessful implementation looked like, and aside from technical knowledge of the software, which was not an element, but then, understanding the principles well enough to apply them to the reality of our setting.

(Don – Post interview, June 2005)

So for Don the issue appears to have been that the functioning of this study group didn’t meet with a level of focus on the principles that would have made it possible for the Knowledge Building Communities principles to be more in view on an on-going basis. Don did report a
change in his understanding and appreciation for what he felt were the related principles of Epistemic Agency (#5) and Pervasive Knowledge Building (#7).

Well, I guess my understanding of what that (Epistemic Agency) is...well, in a way I guess the pervasive Knowledge Building seems to connect to it, or that it’s a part of, that it’s not confined to its own place, you know, that it becomes a part of what you discuss or what you think about or your...That it becomes more of a real thing, that it’s part of...the kids are motivated, the teachers are motivated, they feel a burning interest to answer the questions, to figure something out, to see something work or to understand something.  

(Don – Post interview, June 2005)

Finally, Don indicated on his principles rating sheet that his understanding and valuing of the Symmetric Knowledge Advancement principle (#8) had gone up despite this Knowledge Building Communities principle not being a focus of the group nor ever being mentioned during the meetings. He stated in his post interview that he could see that he hadn’t approached what this principle was suggesting.

I wouldn’t say that this was...I mean, this seems like something that occurs in a fairly--what’s the word---advanced form of Knowledge Building Communities and I don’t think we were even remotely there.

(Don – Post interview, June 2005)

In his post interview Don noted that the most vigorous period of work for him was in March and April. He felt that the study group was working the way they were trying to get the students to work, as a Knowledge Building Community. During his post interview Don made the observation that the Site II study group had attempted to bring the same dynamic to the classroom and their students that they, the teachers, were experiencing in the study group meetings. He went on to suggest that this might actually be a form of the principle of Symmetric Knowledge Advancement (#8).

DON:  Yeah, we were thinking hard about it (the classroom implementation). We were on the edge of our understanding there and pushing the limits. Trying to go beyond there personally and then bringing that same sense or dynamic to the kids and what they were doing. Yeah, it sort of paralleled that way.
UR: Two or three times now in (this) interview, you likened it (the study group) to Knowledge Building. And do you feel that, the idea that knowledge advance is putting it into practice and understanding it?

DON: Maybe because we’re fresh, it’s almost like as the teachers learn, the students will learn. So that’s kind of symmetrical advancement there, I guess.

(Don – Teacher post interview, June 2005)

Analysis of student database work – Tanya/Don

Robotics/Energy

In the fall the class taught by Tanya and Don worked in two views, “Design & Technology” and “Energy and the Environment”. These views were both linked to curriculum that was directly being studied in the classroom. The database activity was analyzed to provide a profile of how the class functioned in these views prior to the introduction of the combined study with Wendy’s class and the study group meetings reported in this case study.

![Figure 23](Image)

*Figure 23. Tanya/Don’s class – Distribution of contributions Design & Technology/Energy and the Environment views; range 0 notes to 19 notes.*
In the robotics/energy views Tanya/Don’s class (n = 26) produced an average 4.2 notes (SD = 4.82), read 36% (SD = 29.48%) of the notes in these views with 70.7% (SD = 42.13%) of their notes being build on notes. Distribution of student contributions to the robotics/energy views (see Figure 23) had about half of the class contributing no notes or only one note each. With respect to reading in these views the range progressed from reading a few notes to reading almost all of the notes for a few of the students (see Figure 24). There were a total of 102 notes in these two views.

**Racism & Discrimination/Slavery/Skin Colour/Culture**

Tanya initiated the racism study as part of her social studies unit. Students in her class first worked in a view called “Racism”. Midway through February, after Tanya had left the school and Don had taken over teaching her class, both Wendy and Tanya/Don’s class began working together in this view. As the number of student questions grew the teachers with my
assistance sectioned these notes out into three other views related to “Slavery”, “Skin Colour” and “Culture”. The distribution of participation in this cluster of views is presented in Figures 25 & 26. In this set of views Tanya/Don’s class (n = 26) produced an average of 5.5 notes (SD = 5.25), read 23.5% (SD = 17.99%) of the notes in these views and 71.4% (SD = 34.13%) of their notes were build on notes. Student contributions to this set of views (see Figure 25) was similar to the previous study but with respect to reading (see Figure 26) the overall number of notes read increased as there were 237 notes written in these views.

Student 69 was selected as an example of a student in the mid-range in term of participation in the research views (see Figure 27). From this student’s writing profile it is clear that the change from a single research view to the multiple set of views in March also created an opportunity for this student to contribute to the database. This and other profiles from this class

Figure 25. Tanya/Don’s class – Distribution of student contributions to the Racism & Discrimination/Slavery/Skin colour/Culture views; range 0 notes to 25 notes.
Figure 26. Tanya/Don’s class – Distribution of reading Racism & Discrimination/Slavery/Skin Colour/Culture views; range 0% read to 77% read.

Figure 27. Tanya/Don’s class – Writing profile student 69 (mid-range)

indicate that there was more database activity during the weeks leading up to the school break, the period that Don described as his most productive period. Although the average number of
notes contributed between the two studies was not significantly different, the distributions (see Figures 23 & 25) indicate that more students were involved in writing on the database.

*Student perspectives - Don*

The sample of students who were interviewed from Tanya/Don’s class all identified the racism study as the most significant of the year and the one that was most like what they thought Knowledge Building was about. A subset of students were identified by Don as being either low, moderate or highly engaged in the two studies.

*Student individual interview responses to the following questions are reported below.*

*What is important to know about the Knowledge Building Communities model?*

“People building, coming with ideas and other people helping them, like from a small idea with other people’s help you get to a big idea and then you can write on the computer for people to get theories or to write about” (student 77)

“Learning ideas and teaching them, ideas can always grow” (student 72)

“About learning (from) different people” (student 65)

“No response” (student 59)

This set of responses suggests that at least two of the students understood the Knowledge Building Communities model in terms of how knowledge or ideas advance. One of the students likened it to the subject that they had been studying while the other student had no response. Overall the profile is of a group of students who are oriented toward learning about a subject by sharing their ideas about that subject between people.

*Who decides how Knowledge Building happens?*

“Our teacher decides” (student 77)

“University researcher decides” (student 72)

“The class and teacher decide” (student 65)
“University researcher” (student 59)

It is very interesting that two of the students who were interviewed identified me as being the one who decides how Knowledge Building Communities happens in their classroom. Clearly my presence in the school and Tanya and Don’s references to me in the presence of the students had an effect on students’ perceptions about who was determining how they were doing Knowledge Building in their classroom. One student felt that it was the teacher that was deciding while the other student suggests that it was a joint decision between the class and teacher. However, none of the students who were interviewed indicated they felt the students were in control of how the Knowledge Building Community operated in their classroom. In terms of Knowledge Building Communities principles this suggests that from the students’ perspectives there was only a low level of Epistemic Agency (#5) in the Knowledge Building Communities design for class. They had some control over their ideas but not the process related to how knowledge was being worked with in their classroom.

What materials do you have in the classroom?

“Books” (student 77)

“No response” (student 72)

“No response” (student 65)

“Internet, my dad and the newspaper” (student 59)

With respect to the materials that were available for use in this classroom it appears that some of the students had an opportunity to use books and the Internet but others did not. One student indicates that his dad was a source of information and that they had used the newspaper to support one of his questions about racism. This suggests that the experimentation Don initiated related to authoritative sources had some affect on some of the students. However, given
the focus placed on the principle of Constructive Uses of Authoritative Sources (#10) it is compelling that the students didn’t reference the leveled readings that had been provided by the teachers to support their research.

How do you know you are making progress?

“Cause you could feel you were writing more theories than you used to in the beginning” (student 77)

“Our ideas grow and we check on Friday” (student 72)

“When we are on (Knowledge Forum) people add-on” (student 65)

“People reading ideas” (student 59)

With respect how the class knows if they are making progress this sample of students from Tanya/Don’s class reported that the activity of reading and building on was an indication that progress was being made. Student 72 extends this to the notion that the ideas are growing and that these are checked every Friday when the classes get together. The most interesting response is by student 77 who suggests that progress is related to the writing of theories and that you can just feel the improvement happening. None of the students indicated that it was the teacher who made the decision as to whether progress was not being made nor did the students indicate it was related to taking a test.

How should Knowledge Building Communities end?

“End with a big idea” (student 77)

“(We) run out of ideas” (student 72)

No response (student 65)

No response (student 59)

This range of responses suggests that some of the students didn’t have an understanding about the enterprise in which they were engaged. However, the idea that they end with a big idea
is in keeping with the Improvable Ideas principle (#2) focus of the Knowledge Building Communities model.

Summary - Don

Overall the profile that emerges for Tanya/Don’s class is one where student interaction around questions that students deem important and are invested in learning about is a focus but that engagement across the entire class of students was largely uneven. Reading notes and sharing information are the dominant features of this Knowledge Building Community with the control of the Knowledge Building Community not in the hands of the students but instead in the hands of the adults associated with the classroom, be it a teacher or researcher. Also, despite the focus that Don had placed on the creation of leveled readings for the students, as part of the study group focus on providing resources, the students that were interviewed did not identify these resources as being part of what they used as part of their Knowledge Building Community. This suggests that the deeper level of the Constructive Uses of Authoritative Sources (#10) principle, the critical review of materials by the students themselves, was not being conveyed to the students. The profile for the database activity for Tanya/Don’s class suggests a class that has a low level of participation that is not evenly distributed across all members of the Knowledge Building Community but that improves slightly when they move to a curriculum topic that is more authentic in terms of student interests. Even so, only about half of the students in this class read only a small portion of the notes and contributed only a few notes over the entire year. The writing profile suggests that the most productive time for this study also coincided with the most productive time for Don and the study group. In terms of the perceived understanding of the Knowledge Building Communities model Don reported that he had developed a new appreciation for what is involved in the integration of the Knowledge Building Communities
model into his local context even though his concerns about student abilities and the curriculum persisted throughout the study group period.

Embedded teacher case study - Wendy

Background

Wendy was in her 6th year of teaching and had used Knowledge Forum during the two previous years with limited success. Wendy in her pre-interview described her understanding of the Knowledge Building Communities model as being based on her reading of several papers during a course she had taken the year before. She also stated that her previous implementation was not focused on the classroom but instead was on the software.

UR: Do you feel you have a deep understanding (of the Knowledge Building Communities model)? How solid would you feel that you understand the whole (thing)?

WENDY: I read some articles last year.

UR: Okay, how many and maybe an example of one you recall?

WENDY: I can’t remember the title but it was by Scardamalia. We did a computer course last year and I was doing some action research in my own classroom to see how I would implement it. So I read maybe about four or five articles last year. But how well I know it? I know there’s a lot more.

UR: Did you focus attention on the principles?

WENDY: No. It was more implementation of actually using the software and how that helps with them communicating their ideas, and how comfortable they feel, and more about the approach. The focus was more on the software than the classroom.

(Wendy Pre-interview January 2005)

Wendy’s initial use of the software was actually through the Ministry of Education as part of a curriculum writing activity a few years earlier.

Well, one thing I did, which was actually how I was introduced to Knowledge Forum, through the ministry, we had to put together a unit. It was about an environmental unit that was supposed to go to Spain or something like that. And we had to use Knowledge Forum to communicate with three teachers, because we were from three different schools so we were trained, and I thought it was incredible to be able to do that.
Wendy anticipated that focusing on the principles would help but she didn’t give details about what she thought that might entail.

I’m interested because I don’t know those principles very well. And I’m hoping to learn more about it and see how (it works).

(Wendy - Pre-interview, January 2005)

Wendy viewed engagement in the study group as having potential value because it might help to alter the “chat aspect” of interactions that she reports had pervaded the previous year’s use.

Using that software and that’s kind of how it’s been (used). So not looking at it as a software package that they get to do certain things in and the classroom is something else. But connecting that in terms of (the classroom), that will kind of help us to bridge that.

(Wendy - Pre-interview, January 2005)

Wendy also anticipated that the presence of the university researcher would help to bring new examples of how the software had been used in other schools into the conversation.

Yes because I’m hoping that (you - the university researcher) would give us some expertise and bring some other experiences outside the context of (Site II) because when you’re in here and all you’re seeing is this, it’s hard to think outside of that.

(Wendy - Pre-interview, January 2005)

However, Wendy hoped that the study group meetings would also include some training on the software.

Just talking to Don and Tanya even, again going back to the software, some training with that. Again, the same thing. To learn more from you.

(Wendy - Pre-interview, January 2005)

Before the study group meetings commenced Wendy was hopeful that I was going to teach her about the Knowledge Building Communities model both in terms of the principles and the software.
Wendy talked about how the organization of the classrooms at Site II, around the library, resulted in her having double the number of interactions with Don the librarian than she might have had if she had been in a hallway configuration.

UR: Have you ever worked in a hallway situation where the classrooms are in a long line.

WENDY: Yes.

UR: Could you put a number on how many more times you’d have conversations with a teacher in comparison to maybe the long line.

WENDY: Double.

UR: Double?

WENDY: Because we’re constantly, just to get to the printer, to get to the lab, that open area. We’re constantly crossing paths.

UR: And how many of those would be chit chat versus instructional?

WENDY: I would say most of it is instructional. Talking about the students, talking about something you’ve learned, a good idea, we do a lot of that. Talking about what’s going to come next. Part of it is that now I work with Don with the math, but even last year when I wasn’t we were still dialoguing. It’s good that we talk with each other.

(Wendy - Pre-interview, January 2005)

Wendy identifies talking with her colleagues as a mechanism she feels she uses to support her teaching. Interestingly, Wendy was in this configuration the previous year when, what she defined as “the messy views problem” in Knowledge Forum had occurred. She reported that eventually the view became unmanageable because too many notes had been created without adding any organization.

Contextual Concerns

During her pre-interview Wendy predicted that her students would have difficulty coming to terms with their ideas as being improvable or even that their ideas could exist in an environment where they could be improved.
In terms of just getting the kids to know that they can have an idea and that it’s valued. And that there’s not always the right answer, which is what they all are looking for. It’s right, it’s got to be perfect, that’s what they’ve been taught for the last few years. So getting them to share the variety of ideas, the diversity of ideas, I think was one of them, and that’s okay. I think it’s something that’s going to be hard, to get to that point, when they’ve accepted that, to not look for, even with the rock idea, what’s the right answer? They didn’t know…So getting them to be able to accept that, I think, is really (difficult).

(Wendy - Pre-interview, January 2005)

And she went on to say,

And also seeing that their ideas are just as good as mine. And not just seeing me as the big owl sitting on the chair and I know all. And what they say, I have to tell them if it’s okay or not, I have to say that’s right and that’s wrong. And not that’s your idea, that’s a unique idea, that’s valued, that’s hard.

(Wendy - Pre-interview, January 2005)

Wendy mentioned it being hard to get students to see “their ideas are just as good as mine.” It’s not clear where this idea comes from but it gives an indication that her classroom practices may focus on addressing the class from the front of the room to convey knowledge to the students or it may have come from their previous school or socialization.

In addition to identifying the issue of students’ ability to see their ideas as improvable Wendy also expressed concern about her students’ abilities to think and communicate in both oral and written forms of language.

I think that it’s kind of hard, actually, because just in terms of sharing, some kids are much more capable of that, just because of language issues. So some kids are already at a disadvantage and it’s not level and there’s some kids who will have a real issue trying to share.

(Wendy - Pre-interview, January 2005)

Finally, Wendy also felt the curriculum was an impediment to doing Knowledge Building properly. In her pre-interview Wendy indicated that during the previous year she had tried to release agency to the students but had found the curriculum was an impediment to doing so.

I think (this is) a huge issue. And this is what I found in my action research. Here’s the curriculum, here’s the way we want to teach, and the way we want our classrooms to be, and I found it very difficult, because I do want the kids to help direct where we’re going,
and I do, for example, when we were learning about rocks, they were really interested in fossils last year. That’s one expectation and that’s why I like the Knowledge Forum, the software, because they were able to continue that outside of what we were doing in the classroom. But I would have liked to allow them to take the focus there, and just, you know, I’ve got to cover two science strands and we’ve got to get to the next. And that’s what I think I found, and that’s where all (these) task-oriented things that we’re doing, there’s this (curriculum) pressure you know….For me I found myself torn from what I really want to do and what I’m supposed to be doing. And ideally, what I’m supposed to be doing should fit into that somehow.

(Wendy - Pre-interview, January 2005)

However, even after they had chosen a research topic that was felt to fit with the Knowledge Building Communities model and with the interests of the students, Wendy still had difficulty finding a way to make it fit into her curriculum. Halfway through the study group meetings, Wendy expressed the feeling that the Knowledge Building Communities work in her classroom was an add-on and was not integral to her main curriculum work.

WENDY: Especially with the curriculum, I think, because right now this is an extra thing. I hate to say it that way, but it is. It’s extra. It’s outside of what we’re doing, and it’s almost like we’re accommodating it, trying to prioritize it, but we’re not prioritizing as much—

UR: Right, it’s not getting in there as much as it could—

WENDY: Right, but if it’s connected, if it’s connected to the social studies unit, even if it takes a little bit of a snag, but it deepens their understanding, then it will be much more a part of our classroom—

(Site II – Study group meeting #5, March 16th, 2005)

Experimentation/Problem solving

A belief conveyed in the proposition that underlies this study is that engagement in a study group will assist with the implementation of the Knowledge Building Communities model by providing time and support for teachers to discuss the Knowledge Building Communities principles in light of the local contextual concerns, and with input from a knowledgeable participant-observer. As such the teachers were encouraged to experiment with their implementation and report the results back to the study group. The winter term began with
Wendy taking the initiative to start a new view to deal with the science topic she was teaching on energy and electricity.

I am planning to create an online Knowledge Forum discussion with the students about Light - our current science unit. I have a few questions in mind to begin the online Knowledge Forum discussion but I am uncertain as to how to lead the children to those questions. How much should I influence them and how much should I allow them to guide the discussion? In fact, should I even approach this with my own questions in mind at all as an end result or should our initial question come primarily from the students?

This raises the issue of being an equal participant. Can we ever really be equal participants? If the kids ask really close-ended questions, I feel that as the leader in the class I should take that role and guide them to more open-ended, thought-provoking questions in order to help them develop an initial question for our online Knowledge Forum discussion.

(Wendy - Database entry, January 25th, 2005)

This was the first note that Wendy entered into the Knowledge Forum database. In it she indicated that she had an idea about how she should start the Knowledge Building Communities off in her classroom. Essentially, she wanted to try something out in her class and she asked about the connection of this idea to how the Knowledge Building Communities model might suggest to proceed. The interactions of the study group that occurred over the following weeks are presented in a later section. Wendy’s main concern is related to the issue of the teacher being or not being an equal participant with the students. As described in the case report, Wendy orchestrated the development of a central question that she then put into the database as a note by herself. This then led to the students building on in a spoke-like fashion with notes radiating out from her central note (Lipman-Blumen & Leavitt, 1999). This approach appears to have fit with Wendy’s concern for maintaining some control over the questions that the students were dealing with on the computer.

In her post interview Wendy reflected on the design challenges and customizations that she felt had made Knowledge Building somewhat successful for her students. Challenges and
experiments that Wendy dealt with over the winter and spring terms included allowing students
to pair-up to write notes together to address the English as a Second Language learners, teachers
making presentations about difficult vocabulary also to support the English as a Second
Language learners, and changing the curriculum focus to mathematics from racism to support her
concern about student participation. At the end of the study Wendy indicated that the English as
a Second Language challenge had been one of her major challenges. By allowing the students to
pair-up for writing she felt she had helped them.

English as a Second Language, was a huge issue because writing is the hardest way to
communicate for them, for a lot of them, and so, they know it’s going to be public what
they write so a lot of them didn’t want to write, they were frightened. And I think they
felt that it wouldn’t make sense and everybody’s going to read it and it’s intimidating.
But a way, not around it completely, but something that helped, was when we did the co-
authoring. Because all of a sudden they weren’t writing by themselves and sometimes
they buddied up with a stronger partner, a stronger writer I should say, not necessarily
thinker, and that really seemed to make a difference in terms of getting more kids
involved.

(Wendy - Post interview June 2005)

The other aspect that Wendy viewed as a customization was the "front-loading" of vocabulary
for her students. Again, the English as a Second Language issues that were so prevalent in the
minds of the teachers at Site II required the teachers to develop features that would facilitate
student participation.

WENDY: Well, definitely giving them more vocabulary, because again like with the
culture view. Culture, racism, discrimination, pigmentation, they don’t know what any of
those words mean. And some of them are difficult to understand, the concepts.

UR: How did you front-load the vocabulary?

WENDY: Well, I think we did it in different ways. Don and I used the Powerpoints, we
tried to bring up, to talk about different races, so Don made a Powerpoint of people from
different races, to say this is what race is, and we talked about culture, again he made a
Powerpoint of it and (Don) showed the basic things about culture, religion, food clothing.

(Wendy - Post interview June 2005)
However, Don and Wendy’s attempts to frontload vocabulary using Powerpoint were seen by some students as not being helpful to their progress (see student perspectives section). Wendy also reflected on the student comment that she and Don spoke too much during the whole group sessions. Wendy felt that they did this because she and Don were trying to figure the Knowledge Building Communities model out as they were proceeding with the implementation. One student’s comment suggested to Wendy that at least that student was ready to assume more responsibility. As a result Don and Wendy suggest that they began to shorten the length of time they spoke to the group as a whole.

Initially Don and I would talk, because we were feeling our way around it as well. So sometimes a discussion could take about a half an hour, and in a half an hour we have about six kids that are paying attention to us and then one of my students said, we’re going to talk about again? And she’s one of my bright ones, who usually is pretty eager. And she said it’s so boring, and I said why? “Because you guys talk too much.” So right away we cut it down, we tried to, like ten minutes maximum, to give them more discussion time.

(Wendy - Post interview June 2005)

This insight is related to the principle of Epistemic Agency (#5) but the principle was not explicitly discussed by the study group in any detail at any point. In her post interview Wendy indicated she had no knowledge of this principle.

Wendy also spoke about the curriculum area as a major issue for how Knowledge Building proceeds and this was one of the experiments that she and Don had tried in terms of improving their implementation of the Knowledge Building Communities model. Despite the authentic nature of the racism topic Wendy indicated that she felt her past experiences at holding discussions with 10-year-old students about the topic of racism was a major block for her. She felt that working with the students on a topic that they had some knowledge of, and that she had a comfort level with, would have aided her implementation. This was part of her argument for
shifting the curriculum focus of the Knowledge Building Community from racism to mathematics, that she and the students would be more comfortable.

WENDY: Again, I’d start in what I think I’m stronger in so that I feel like, the culture thing, it was so deep, to me it was muddled and we’re trying to figure it out, so I felt like I needed a goal, to figure out how to navigate through this. But I think if we started with math again, I feel really comfortable with it and I would love to see them take off with it. And I’d feel comfortable about where it would go.

UR: So if you were more proficient in the domain...I asked that question about teachers’ depth of understanding with the domain, was pretty low, and came up to a three, but I think you also mentioned in doing that math was partly on your side there.

WENDY: Yeah, it’s not even my understanding generally but my experience discussing with ten-year-olds is not that much (in the racism study). There is a little bit but not at that level and not as deep.

(Wendy - Post interview June 2005)

Wendy indicated that she felt the study group could have spent more time talking about the content area of racism when that was the study topic for the students. She expressed a sense that they needed to do things that they didn’t normally do in relationship in to their curriculum topics.

In response to a question about the functioning of the study group Wendy stated the following:

WENDY: Spending time (on) how do we teach culture. We know how to teach long division and I’ll throw some number cues at him and he’ll just go. But with this we kind of had to figure out, well, ‘what is culture and how would we show that to them’, and then we started going on the Internet, and things like that that we would never do.

(Wendy - Post interview June 2005)

Teacher change

Initially there was some question whether Wendy would or would not participate in the study. She consented to be interviewed in October but then decided not to proceed. When she did join the study in January she was re-interviewed. This provided me with two samples of her ratings of the Knowledge Building Communities principles and the other instruments used during the teacher interviews. In the following excerpt from her post interview Wendy reflected on why her score for the applicability of the theory to the local context went down (October to
January) and then up (January to June). Wendy suggested that it was because of the reality of where the students were starting from and also her increasing awareness of what the Knowledge Building Communities model actually entailed.

UR: Applicability of the Knowledge Building Communities (model) to this school setting, from the first one you went from a three down to a two, in January.

WENDY: Now I’m kind of in the middle of those two.

UR: So it’s coming back up.

WENDY: It’s right about there (points to 2.5).

UR: So you’re still not back to the optimism you had at the beginning of the year.

WENDY: No.

UR: That’s okay.

WENDY: It’s just where they (students) are starting. It’s not that I don’t believe in it but it’s where they’re starting, where they’re coming from here. That idea of building knowledge together and sharing and improvable ideas is still (hard) for a lot of them.

UR: Would you say that the change in that score had anything to do with your understanding of what the whole thing (Knowledge Building Communities) entails and what’s it’s about?

WENDY: Yes. At first I felt like I had to change my whole room around, then I felt like no I don’t, we can take baby steps. Then I went back to ‘no no, we have to change the way things are done.’ Because, they’re just, it’s gotta be the discourse, it’s gotta be everything, but then it’s so hard to take them, number one it wasn’t as integrated as much as I’d like anyway, but to take them to that when all along they’ve been told wrong or right their whole life, in everything, even a drawing, is it good, they need your stamp of approval to think it’s good. A picture, forget anything else, an actual thought of their own.

UR: So this is (a) knowledge advance problem...understanding—

WENDY: Nothing, and that’s a small little thing that you suggested...I definitely think if I started at the beginning of the year to integrate it more than we can and it would be more applicable because we’d grow into it. But what we need is everybody to be doing something like that, or at least try. Throughout the grades, because they come to grade four and all of a sudden I’m saying something different. It takes time. I think that
starting in September it would be different because I would start and it would be part of my (program).

(Wendy - Post interview June 2005)

In this portion of her post interview Wendy indicates that she really had been influenced by her attempts to implement the Knowledge Building Communities model in her classroom and the student success she observed. In the last segment Wendy conveyed that for the Knowledge Building Communities model to be successful it needs to be incorporated into the school at large. That for the students to see their ideas as improvable in grade four they need to have started thinking that way back in grade one. This is an important insight as it speaks to Wendy’s developing realization that the Knowledge Building Communities model requires a substantial change in one’s classroom and for the students as well. She expressed the feeling that students need to be living in a context where they are expected and allowed to behave and interact in this new way. But for her current group of students she also expressed a feeling that this approach was above them and that they weren’t ready for the expectations the Knowledge Building Communities model had for them in terms of formulating and putting forward their own ideas. This impasse was difficult to deal with given the infrequent meetings and limited time the teachers were giving to explore this new way of working in the classroom (e.g. one period Friday mornings). Even so, Wendy did report changes to her understanding and appreciation for the Knowledge Building Communities principles.

Wendy self-reported gains in her understanding of several Knowledge Building Communities principles particularly in relationship to three principles that were not explicitly the focus of the Site II study group: Real Ideas, Authentic Problems (#1); Community Knowledge, Collective Responsibility (#6); and Democratizing Knowledge (#7). From her statements about the Knowledge Building Communities model (see Table 7), completed before and after the study
group meetings, there was a slight change in her description of what this approach would look like in practice. Most notable in the post description Wendy states that students need to take responsibility for making a contribution and that there should be less focus on sharing the right answers but instead focus should be placed on the process of, “working through it and dialogue where it’s democratic, (and) everybody has a say” (Wendy – Post interview June 2005). The gain in her appreciation of the importance of students taking responsibility for becoming involved and making a contribution came out of her frustration with students sitting back and not making a contribution. In her post interview she stated the following.

Everybody is a part of it and it’s a democracy and we get to share and build together. It’s not (student name) has the right answer and you don’t have a say. So everybody has a say, but that kind of goes back to the other one. A lot of them don’t, they don’t even want it to be a democracy, they just want to sit there and again it goes back, it goes back to all of this. What’s happening throughout the grades? How are we programming these children? Why do they feel like they don’t want to have a say? There is a handful that do, and they need to say what they think, but there’s a large proportion of children who don’t want their other, don’t want to put in anything, they just want to sit there, and bringing them, making them, I think they need to be pushed, and they need to have a response.

(Wendy – Post interview June 2005)

The gains made in Wendy’s understanding and appreciation of the Real Ideas, Authentic Problems principle (#1) can be traced back to the curriculum focus that was chosen in January, racism. Likewise the gains Wendy made on understanding and appreciating the Democratizing Knowledge principle (#7) are traceable to her concern and attempts to provide a way in for her English as a Second Language students. Co-authoring and reading of notes, preparation of lessons to deal with new and difficult vocabulary and finally the change she made to the study focus, moving from racism to mathematics, in order to allow her students to participate in something they might more easily understand and therefore participate in were directly connected to democratizing the classroom.
Table 7.

Pre and post Knowledge Building Communities principles statements - Wendy

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
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<tbody>
<tr>
<td>The Knowledge Building approach, that knowledge is not a transmission where the teacher is just giving the kids information and they kind of regurgitate it back to you, but that we’re all working together to build knowledge. The teacher does play a key role in terms of initiating conversations, giving them ideas to work with maybe at the beginning, but then that’s not the be all and end all. We start off with something but then the kids carry it through. I still get be a participant but it’s not like dialogue on the carpet, where ‘you talk, I respond, you talk, I respond, you can’t talk right now’, but it’s more that we’re sharing information and valuing each other’s comments.</td>
<td>So it’s the teacher and students working together to build knowledge collectively, where we’re working with ideas, and we’re building on each other’s knowledge and thinking. Really for a lot of times there’s no real, ‘this is what the answer is and this is where we want to get to,’ but it’s actually the process of building knowledge together and working through it and dialogue where it’s democratic, everybody has a say and everybody’s responsible to contribute.</td>
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The explicit focus of Site II study group, as determined during the first conjecture meeting, was to be on the principles of Improvable Ideas (#2), Constructive Uses of Authoritative Sources (#10) and Knowledge Building Discourse (#11). Each of these principles was discussed during the meetings and Wendy reported that her understanding and appreciation for these principles had increased as a result of participating in the study group. She made the following statement in her post interview that indicated she saw a connection between the back and forth discourse and the growth of ideas. However she still maintains the concern that the students might not be able to fully engage in this process.

Things could always get better by getting more information. By listening to other’s ideas. Things grow, there’s not this final answer that they always think and by putting more pieces of the puzzle together, it almost goes this way, it can progress. How would I get that into my class. That’s a hard one because it has to do with deprogramming the kids.

(Wendy - Post Interview June 2005)
Wendy didn’t explicitly advance her understanding of the principle of Pervasive Knowledge Building (#7) however she did question it during study group meeting #5.

And there’ll be, reading content, more discussions, and then it won’t be like, ‘oh we have to do Knowledge Forum for an hour so that we can discuss it, but it’s just a part of what we’re doing, which is really what it should be, right?’

(Site II – Study group meeting #5, March 16th, 2005)

In her post interview Wendy related a story of how the student’s reading of authoritative sources about slavery became a topic of discussion for their parents.

Yeah, what was good about that, it (slavery) was forced initially but then a lot of them were really interested in their readings and they discussed it with their families at home. A lot of the parents could relate, like, we were talking about child slavery, just children as workers, and slavery of the past. A lot of the parents were actually happy that their kids were reading about stuff like that and they discussed it, they shared their own experiences. Some of the kids came back and talked about how their parents were discriminated against, and their parents’ childhoods, so it was great. And I liked that they were starting to see their parents, their mom, their brothers and sisters, as authoritative sources, not just the paper, which I’m always trying to get them to think about that.

(Wendy - Post interview, June 2005)

It is interesting that the use of authoritative sources (Constructive Uses of Authoritative Sources - principle #7) became connected to the principle of Pervasive Knowledge Building (#7).

In the post interview Wendy noted that she could see that the Idea Diversity principle (#3) was an important aspect of the theory and that they hadn’t promoted it as much as they should have during the year. Wendy stated that it was because of her experience with the implementation of the theory in practice that she had come to this realization.

(W)hen I think of idea diversity I can see how important it was this year. We need lots of pieces to the puzzle, and what ends up happening, like on their view, for example, somebody puts in one idea, and then fifteen kids say that was a good idea, and they might say why but they don’t introduce anything new. So I see it as really important that there need to be (lots of) ideas, I like the example of an eco system, that all the pieces have to be there and it gets better and better and better, and kids come from their own different experiences and they have things to share that can make the picture clear, can add more, but again, most of them.

(Wendy - Post interview, June 2005)
This insight about the importance of having a diversity of ideas runs counter to how Wendy started the Bright Ideas! view in the database and how that study was guided by questions that she had helped to orchestrate.

Although she didn’t feel that her practices around the Rise Above principle (#4) had improved she did feel she had come to a new understanding of rise above as the synthesis of current understanding and not just a way of cleaning up a view. She also expressed the feeling that she had developed a strategy for how she would deal with rise above in the future.

WENDY: Okay, I’m going to tell you my issue with rise above. How we used it right now I think was to clean up the messiness. Okay, all of this is about a topic, and Don was like, let’s put this in the rise above. But I felt like the idea of the rise above is to kind of say here are all these ideas, and then what you had modeled with them, kind of a little summary, what is this rise above about and we did that together, so it was about organizing ideas but also bringing them together. And I find again, for the kids, they need a lot of guidance to do that, to synthesize everything, and we weren’t really getting that from them. And then it ended up just being more like a clean-up issue. And then just kind of looking at that and thinking about creating a new view from this, and a new view, and a new view. A lot of the kids were getting confused with all these views and what did it mean.

UR: Okay. How would you get more of what you believe rise above should be into (your classroom)?

WENDY: I think we need to do more practice with that just on paper, just in groups. Like here’s several ideas, what is the message of this, what is this trying to…and getting them to write that little caption or whatever, this is what, this is, and putting it together, synthesizing, but doing it on paper, with simple stuff, not (the research topic) culture. 

(Wendy - Post interview, June 2005)

Wendy had no response for the Epistemic Agency principle (#5) during the post interview. This principle had not been a focus for this study group. Rather Improvable Ideas principle (#2), Constructive Uses of Authoritative Sources principle (#10) and Knowledge Building Discourse principle (#11) had been identified as focal principles for this study group. But the Epistemic Agency principle (#5) was discussed during the meetings and Wendy did
respond positively at one point about the possibility of some students taking more responsibility in one of the views.

You know we were talking about it, and I was like, yeah. But I guess because it’s not constant, not dialogue, we’re not talking about that all the time, and I’m not thinking about it in those terms…But we did bring it up. Unless maybe we were talking about it and I was thinking something different…(W)hen we were going to plan the week (long study), I need to know Monday, Tuesday, Wednesday, Thursday, Friday, because that’s how I do things. And this is more allowing things to develop and as things are building, the course isn’t charted and things are growing and developing and changing, which I love, but it’s hard for me to do. It’s a control thing, I think, the traditional teacher rule.

(Wendy - Post interview, June 2005)

Wendy clearly associates this principle with how the teacher approaches the classroom and feels that she didn’t allow this to happen because of her need to know what was going to happen next.

The influence of the students’ work as an indication for how the teachers should move forward was also presented by Wendy although she also felt the students didn’t know they were directing the Knowledge Building Communities model in this way.

(Y)ou know with the culture view, we didn’t know what to do next, so we were constantly looking at what the kids were doing… As far as the kids seeing that, no. They were waiting for us to tell them the next step, they weren’t saying where they think they should go next.

(Wendy - Post interview, June 2005)

With respect to the principles that stood out as having been worked on by the study group, Wendy suggested that it was the following principles that were the focus of the group.

WENDY: Definitely Real Ideas (Authentic Problems) because that’s where we started from. Authoritative sources we did a lot of. I don’t want to say we focused on (Knowledge Building) discourse, but we tried it. But I think we should have done more. We tried some pervasive Knowledge Building but I didn’t think I was focusing on it as much as I should have.

UR: Okay, so far you said, Knowledge Building Discourse, Constructive Uses of Authoritative Sources, Real Ideas...any others?

WENDY: (pause) I think we were trying, we did focus on rise above, we were trying to work on that together.
UR: Well, that’s what really brought you to me or me to you, this desire to go beyond the messy view.

WENDY: Right. And I think even, improvable ideas, they just kind of go “blah” and spit out what they think, but I’ve been trying to get them to look at each other and contribute to each other and really try to build something and not just say ‘thanks, that was good.’

(Wendy - Post interview, June 2005)

Overall Wendy made gains in her perceived understanding of the Knowledge Building Communities model as a result of her experiences seeing her students trying to participate as a Knowledge Building Community. Gains in her perceived understanding related to specific aspects of the Knowledge Building Communities model were also influenced by her regular meetings with Don and to a lesser extent her more infrequent meetings with both Don and the university researcher in the context of the study group.

Analysis of student database work - Wendy

Bright Ideas!

As indicated by Wendy she intended for the Bright Ideas! view to be part of her curriculum unit on energy and electricity. As such, the students were encouraged to go into the database to address the question that they had developed together with Wendy about what life would be like without light. In the Bright Ideas! view, Wendy’s class (n = 17) produced an average of 3.1 notes (SD = 5.21), read on average 12.6% notes (SD = 19.44%) and 70.7% (SD = 42.13%) of their notes were build on notes. The distribution of student reading in the Bright Ideas! view indicates that not all of Wendy’s students were participating in the database discussion (see Figure 29). Overall this profile suggests that some students had more opportunity to go on the computer while others may have had no opportunity.
This study was begun in Tanya/Don’s class with the creation of the Racism view. In mid-February the two classes came together in the pit area of the library to discuss the two classes joining together in the study of racism. Contributions and reading activity for Wendy’s class (n =
17) in the set of views that were developed over the following month (Racism & Discrimination/Slavery/Skin Colour/Culture) were as follows: Wendy’s class contributed an average of 4.7 notes (SD = 4.87), read 15.50% (SD = 19.37%) of the notes in these views and 72.60% (41.92%) of their contributions were build on notes. As for the influence of the study group meetings the deliberate experimentation that was tried by the teachers was done on these views and in this study. However, there was unevenness to the engagement of the two classes. Wendy’s class joined this study after Tanya/Don’s class had started and this may have been a factor in the lower levels of participation.

What is apparent from the distributions for both contributing (see Figure 30) and reading (see Figure 31) is that Wendy’s class participated more in this study but also that a good portion of her students still did not participate to any great extent beyond the writing of one note, some without reading any notes first (e.g. students 42, 44 & 50).

Figure 30. Wendy’s class – Distribution of contributions Racism & Discrimination/Slavery/Skin Colour/Culture views; range 0 notes to 15 notes
In the “Action Fractions!!!” view Wendy’s class (n = 17) produced an average of 4.9 notes (SD = 5.67), read 25.6% (SD = 21.79%) and 52.9% (SD = 41.23%) of their notes were build on notes. The profile of using the database for mathematics demonstrates an increased level of reading by the students (see Figure 33) across the members of the class. However the level of contributing is similar to the previous study (see Figure 32). A comparison between the student reading levels in the math view and the fall research views, which lasted roughly the same length of time, suggests a two-fold increase in their reading activity. The main explanation for this change appears to be that there was a change in terms of student access to the computers given that the curriculum topic was now something that was more frequently situated on the timetable.
Analysis of the writing profiles for two mid-range students in Wendy’s class yielded an interesting difference. Two of the students in the mid-range (in terms of contributions to the
database) are presented in Figures 35 and 36. Student #46 made their main set of contributions to the database during the electricity and energy study (Bright Ideas!) while student #54 was far more active during the Action Fractions!!! study. Neither student contributed any notes during the racism study. Questioning of the students during the interviews revealed the way students were selected to go onto the computers and that several didn’t feel they had been given enough time to contribute during the racism study. When Wendy moved to using the Knowledge Forum database during her mathematics period she also increased the time that was made available for students to be able to go onto the computer to read and write notes in Knowledge Forum. This increase in class time for students to go on the database appears to be connected to her reported feeling that mathematics is something that the students are capable of working at and that it is something embedded in the curriculum. For some students this made all the difference.

**Figure 34.** Wendy’s class—Writing profile of a mid-range student (student 46) from January to June. The range for words produced is 0 words to approximately 225 words and the diversity of the words is approximately 100 words.
Figure 35. Wendy’s class—The line graph shows the writing profile of a mid-range student (student 54) from January to June. The range for words produced is 0 words to approximately 300 words and the diversity of the words is approximately 150 words.

Student perspective - Wendy

All of the sample students who were interviewed successfully identified the various study areas that had been addressed by Wendy’s class during the school year. There was a split between the racism study and the fraction study in terms of which they felt they would most like to continue studying. However, when asked about importance, several made strong statements about the need for the racism view to be published so other kids could learn what they had learned. With respect to participation in the database the interviews revealed some interesting insights. For instance, during her interview student 44 indicated that she felt the view that was an example of the best interaction was the Racism & Discrimination view. However upon investigation it was found she had not participated in that view. She said this was because she hadn’t been picked to go on the computer. In the Action Fractions!!! study, student 44 was more active. When asked about what a wonderful Knowledge Building day might look like she responded, “all (the) kids get to go on the computer” (Student 44 interviewed June 2005).
asked what might be a solution to this problem of not having enough time to go on the computer she suggested she could use her recess. Student 56 also felt that the students had not been given enough time to go on the computers during the racism study as they did during the fractions study. She indicated that, “more kids got a chance to participate (in Actions Fractions!!!!)” (Student 56 interviewed June 2005).

Student responses to the following questions are reported below.

What is important to know about the Knowledge Building Communities model?

“(Knowledge Building) is about sharing our ideas and helping each other with our ideas” (student 46)

“Where people go on (Knowledge Forum) and add onto each other’s notes” (student 44)

“It’s about helping people learn about new things on Knowledge Forum and adding new ideas to it. Kids giving different ideas so people could learn new things instead of just reading notes and not answering” (student 52)

No response (student 56)

For student 44 the Knowledge Building Communities model is all about getting to go on the computer. Student 56 doesn’t have a sense about what the approach is about but student 46 and 52 both link it to working with each other’s ideas so they can learn. These responses indicate that at least a few of the students in Wendy’s class saw interaction around ideas as an important aspect of the Knowledge Building Communities model. This links to the Knowledge Building Communities principles of Knowledge Building Discourse (#11) and Improvable Ideas (#2).

Who decides how Knowledge Building happens?

“Teacher decides what we do” (student 46)

“Teacher picks a few people to go on the computer” (student 44)

“The teachers decided on the questions” (student 52)

“We decided it with the teachers and said we wanted to discuss racism” (student 56)
For the most part the profile that emerges from the student interviews is of a classroom where the teacher determines how the Knowledge Building will happen. Again, for student 44 the Knowledge Building Communities model is about getting to go on the computer. Student 56 extends this to the choice of doing racism but student 52 and 42 both state that it is the teacher that decides what they are going to do each day and that this choice can limit their ability to participate.

What materials do you have in the classroom?

“No books, photocopied sheets” (student 46)

“No books” (student 44)

“Not really (resources)” - student 52

“Some people used paper. In the racism view some people used books” (student 56)

The responses to this question suggest that the students didn’t feel there were a lot of books or other materials provided to go along with the study of racism. From the teachers it is clear that several readings were used during the time when the two classes came together and that there was homework given in this area. However from the students’ perspective these materials were not available to them. This may suggest that availability of authoritative sources may be linked to the level of agency students felt they had over their inquiry in that the readings that been given and not chosen by the students.

How do you know you are making progress?

“We talk about it” (student 46)

No response (student 44)

No response (student 52)

“We sat and looked at all of the questions and the answers and (decided) if we figured out the answer” (student 56)
Two of the students had no sense about how the group went about determining if they were making progress. The other response from student 56 indicates that it is through checking back to the original questions that you determine if you are making progress. Again, this focus on addressing a fixed set of questions that don’t change is an indication that the Knowledge Building Community is focused on attaining particular knowledge in a certain area of study.

*How should Knowledge Building end?*

“Build on every question” (student 46)

No response (student 44)

“Everybody should learn about all they need to learn about new stuff” (student 52)

No response (student 56)

Wendy’s sample of students had difficulty answering this question partly because none of the studies had officially ended in any formal way. The statements by students 46 and 52 both point back to the focus on learning certain knowledge related to certain questions that have been asked in the context of the Knowledge Building Community.

*Additional Data - Wendy*

An impromptu conversation with a student from Tanya/Don’s class about the work going on in the Action Fractions!!! view indicated she was also reading and writing in this view. She indicated that she realized that what she was doing in this view wasn’t strictly in keeping with her understanding of the Knowledge Building Communities model. However she also saw what the students were doing in this view as energizing to her and that she could see a way to move the study more towards the Knowledge Building Communities model. The following discussion traces this conversation.

UR: So what do you think of this? You know, you’ve been studying different
cultures, and doing views on culture and now this math thing comes along...what do you think about that?

STUDENT 83: It gives me a chance to not be starved.

UR: Not to be?

STUDENT 83: Starved

UR: Of?

STUDENT 83: Knowledge... because...

UR: What do you mean by that?

STUDENT 83: Because most of the stuff is so boring that I get starved so much and I don’t want to eat it anymore, you know what I mean?

UR: Yes.

STUDENT 83: So then I get bored so now I can just come running by and I have a chance to be able to think about the (math) question instead of just understanding them right away. So I have the chance to think about them.

UR: What’s the most challenging idea or problem that’s going on in this (Action Fractions!!!) view?

STUDENT 83: Um, it’s the one...the one I’m doing now for the...this one (points to screen) because like it says...so um it’s very, you have to listen to everything, you have to get every single clue of it or else you wouldn’t understand any of it at all. So it’s very interesting.

UR: So you like this idea (of doing math in Knowledge Forum)?

STUDENT 83: (nods)

UR: Great...Did you feel an excitement in the air, was that different than other days when you were doing culture?

STUDENT 83: Sort of, yeah

UR: Is it because you get math?

STUDENT 83: Yeah...Well, so I know that I could solve it, I know there’s a mystery for me to un-solve.
UR: You know I’m interested in Knowledge Building…do you think what you’re doing there is Knowledge Building?

STUDENT 83: Not really, but it does build your knowledge.

UR: Okay, but I’m interested in the ‘not really’ part. What’s the ‘not really’ part?

STUDENT 83: The not really part is that…um…not really because we could solve this but about the culture stuff we had to research it and like ponder about it but these questions, these we could solve. I mean, this question I could solve, but lots of kind of questions—

UR: Do you think…there was a question up above (in the Action Fractions!!! view) that was about fractions and decimals, which is more of a Knowledge Building question—

STUDENT 83: But that is a Knowledge Building—

UR: You think that too? Do you think you could use this to knowledge build about math as opposed to problem solve questions? What’d you think of that?

STUDENT 83: You could do that also.

UR: Any questions you have about math that you’d like to take up on the view, that aren’t there yet?

STUDENT 83: I wonder if numbers go on and on—

UR: You wonder what?

STUDENT 83: If numbers ever stop.

(Site II - Classroom discussion, June 3rd, 2005)

Summary - Wendy

Despite reporting several areas of gain related to understanding and appreciation of the Knowledge Building Communities principles, Wendy’s overall profile in terms of the Knowledge Building Communities model is that she has an essentially surface understanding of the principles. Focusing her projected approach as involving: (a) the use of resources and reference material as representing the principle of Constructive Uses of Authoritative Sources (#10) instead of considering students’ ability to take a critical and constructive approach to the
content of what they are reading and referencing; and (b) the reading and writing of notes as engagement in the principle of Improvable Ideas (#2) instead of focusing on the actual ideas that were improving. Overall, Wendy’s concerns regarding curriculum coverage and limitations in students’ abilities to communicate became grounds to shift her implementation away from the topic that was associated with the principle of Real Ideas, Authentic Problems (#1) to the topic of mathematics problems that she deemed more appropriate for her students. In terms of the proposition, she states clearly that although she understood the premise of the study group, she would have preferred to have been told how to create a Knowledge Building Community in her classroom. Her discussions with Don appear to have been most instrumental to her design.

Site II – Summary

For both Don and Wendy the contextual concerns related to the students and the curriculum were ever present in their thinking. However, during the period from January to mid-April these concerns were being met through focus on specific Knowledge Building Communities principles which framed out the problem space and through the study group discussions they found ways to positively approach these concerns. However the reform message that was being conveyed through the whole group meetings was also competing with their own teacher-to-teacher channel of communication which they both felt was equally influential on their classroom practices and their thinking about the Knowledge Building Communities model. Also, as time went on and there was a quantity of student work to consider, both Don and Wendy began to feel that some students were not connecting with the topic of study and in one dramatic move Wendy sought to alter the dynamic for all of her students. This response to the perception of negative outcomes for her students fits with Owston’s (2007) finding that for a classroom reform to move forward teachers must continue to see success for their students. Could this turn
of events have been avoided? The frequency of the study group meetings (bi-weekly) and the lack of integrity of the composition of the group (holding meetings without all members present) potentially worked against Wendy and Don continuing to make progress on their design. In moving onto Site III the decision was made to shorten the period of study (one four to six week unit) but increase the frequency of the study group meetings (weekly). Also, the importance of taking into consideration contextual concerns such as student abilities and the curriculum topic being within the normal range of school topics, were both taken as lessons learned from this case study.

Site III

Overview

This portion of the report presents the case of the Site III study group as it relates to the proposition that: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. Overall the findings from this case study follow the literal replication logic (Yin, 2008, p.54) that asserts that researchers might find similar results for predicable reasons. As outlined in the previous section the Site III study group design was informed by findings from the Site II case study. Specifically, the duration of the study group period was shortened and intensified so as to increase the likelihood that there would be tighter cycles of classroom experimentation and discussion in the study group. All of the teachers reported gains in both their perceived understanding and appreciation for the model as a whole and several of the Knowledge Building Communities principles in particular. Focus is placed on Kelly and her class as she made the most use of the Knowledge Forum database, she reported the most dramatic changes to her perceived understanding of the Knowledge Building Communities
model and also how she implemented it in her classroom. These findings are taken up in the sections to follow.

The Site III case study is entirely comprised of work done during the months of January and February of 2006. In January the three teachers, Chris, Alice and Kelly, were each interviewed to establish their initial perceptions about the Knowledge Building Communities model and the underlying principles. Again, both Chris and Alice had never used the Knowledge Building Communities model in their classrooms and Kelly was in her third year of using the Knowledge Building Communities model. After the interviews the Site III study group held a conjecture meeting to determine what aspects of the Knowledge Building Communities model they were going to focus on and how they were going to work together as a group. At the conjecture meeting, Kelly outlined how the Knowledge Building Communities model was typically approached by teachers at Site III. Kelly stated the following as the existing Site III “way of doing knowledge building” at Site III:

Essentially when I start(ed) Knowledge Forum in my class, what I do is we do a KWL (Know-Want to-Learned) chart, and the kids tell me what they know and basically what they want to know. But instead of doing it all on paper, they do what they know, we make a list as a class, sort of a general brainstorming… And I give each kid two post-it notes, and then they need to write down two questions about what they want to know… and then what happens is they throw all their post-it notes up on the board, in any order. Before they write their questions, we talk about what type of question. It be a question that can be a yes or no answer, it can’t be a question where, if I go, one place I’m going to find the answer right away… Then what we do is I have them all sit down and I talk about each question individually… And we sort them in two groups and we come up with general questions to represent those groups. Then to start them, the kids rate which questions they’re interested in studying… So then we would then introduce them to the database and the software, where I would have already built in the views, which you guys have already seen. And the kids go in and they make their first note. For their very first note they put it under the question where we are (working).

(Site III - Conjecture meeting, January 10th, 2006)

Key elements of the design that Kelly described included the use of an off-computer activity to create and vet student questions, the sorting of students and questions into groups and
only after the questions have been determined are the students introduced to the software. It is evident that this design is weighted on teacher control of the process, with student questions treated as commodities to be traded and subsumed. It is also very dependent on activities that are happening outside of the Knowledge Forum database. In her post interview Kelly stated that this design was what she had been taught to do through her work with other teachers at Site III. Both Chris and Alice expressed that they were comfortable with the design Kelly had described.

As the conjecture meeting unfolded the teachers each took turns stating their main concerns and which of the principles they felt they were going to focus on during the study group period. Chris expressed concern about how she was going to manage the classroom as the Knowledge Building was taking place. The principle of Epistemic Agency (#5) was tied to this concern although only Kelly had any understanding of this principle. Combined with this management concern both Chris and Alice wanted to figure out how to encourage students to see their ideas as improvable (Improvable Ideas – principle #2). Alice also wondered how her students would deal with gaining access to the work that was going on since Kelly’s class had already begun studying Light & Sound and Alice’s students would need to enter after Kelly’s students had begun their Knowledge Forum work (Democratizing Knowledge – principle #5). More specifically, Alice wondered about how one of her English as a Second Language students was going to gain access to the Knowledge Building that was happening in the Knowledge Forum database. The group spent time discussing this issue with the suggestion of translating the notes as one possible solution. There was also an expressed desire to improve their approach to Knowledge Building Discourse (principle #11). These four principles: Improvable Ideas (#2); Epistemic Agency (#5); Democratizing Knowledge (#7); and Knowledge Building Discourse (#11) were raised as the focal principles for this study group. Kelly agreed that she would monitor how Chris
and Alice were doing on these principles but she also felt her design was satisfactory and that what she wished to focus on was the principle of Rise Above (#4) and the principle of Idea Diversity (#8) which she felt were linked. Finally, the group discussed the timing and duration of the study group meetings. Due to the fact this was to be a shorter more intense set of meetings the group decided to meet weekly, Thursdays after school for forty-five minutes to one hour. The conjecture meeting ended with the set of focal principles and the associated concerns being summarized and note being written in the Knowledge Forum database.

Table 8 summarizes the major problems that the Site III study group raised and dealt with over the course of the study group trial. It can be seen that the majority of the problems came from

Table 8.

Problems dealt with during study group meetings – Site III

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Problem</th>
<th>Who Raised/Led Conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No specific problems were discussed</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>How will the three classes work together?</td>
<td>Kelly</td>
</tr>
<tr>
<td>2</td>
<td>How to encourage right discourse – KB Discourse?</td>
<td>Kelly</td>
</tr>
<tr>
<td>2</td>
<td>Problem of ESL learners access to the KB community</td>
<td>Alice</td>
</tr>
<tr>
<td>2</td>
<td>Student ideas as legitimate or important to other students</td>
<td>Alice</td>
</tr>
<tr>
<td>2</td>
<td>Access to computers is a contextual constraint</td>
<td>Kelly</td>
</tr>
<tr>
<td>2</td>
<td>Getting student questions out into the classroom and resourcing these questions</td>
<td>Chris</td>
</tr>
<tr>
<td>3</td>
<td>How to instruct students when whole class is present?</td>
<td>Kelly</td>
</tr>
<tr>
<td>3</td>
<td>Re-organizing the view with students</td>
<td>Kelly</td>
</tr>
<tr>
<td>3</td>
<td>Encouraging Knowledge Building Discourse</td>
<td>Kelly</td>
</tr>
<tr>
<td>3</td>
<td>Encouraging students to justify statement in Knowledge Forum</td>
<td>Chris</td>
</tr>
<tr>
<td>4</td>
<td>ESL student’s ability to communicate using graphics – mouse problem</td>
<td>Alice</td>
</tr>
<tr>
<td>4</td>
<td>Encouraging KB Discourse – removing the names from notes</td>
<td>Kelly</td>
</tr>
<tr>
<td>4</td>
<td>How do new questions get put into the system?</td>
<td>UR</td>
</tr>
<tr>
<td>4</td>
<td>Why do we put the questions on the view?</td>
<td>Kelly</td>
</tr>
</tbody>
</table>
Kelly and Alice. In study group meeting #1 no problems were discussed. This was perhaps as expected since the conversation was predominantly about learning the technology (i.e. Knowledge Forum) and what was happening in the context of the classrooms only began to be discussed in study group meeting #2. Kelly raised and led the conversation around the majority of the problems that were identified by the group. Of the fourteen problems that were discussed in the remaining three meetings Alice raised three, Chris raised two and I posed one problem each.

Study group meeting #1 was almost entirely about the Knowledge Forum software as both Chris and Alice had never used the Knowledge Forum software with students. The version that Alice had used in her university class was different than the one that was being used in this trial so both teachers needed to be taken through the most basic technicalities of the software (e.g. logging in, creating a note, scaffolds, drawing, build-ons etc…). The only advanced feature of the software that was discussed was how to put a website address into a note for referencing purposes. The Knowledge Forum view for use by the Site III study group was made available to the group during this first meeting and instructions for setting this up at home were also shared. None of the teachers felt they would be accessing the database from home either for technical (e.g. no Internet service) or for personal reasons (e.g. no time). As far as classroom activity was concerned Alice reported that her kids were working on Light & Sound research off of the computer and Chris reported that her students were in the database but that they were only reading the work that had been previously done by Kelly’s class.

The second study group meeting at Site III was a broad ranging meeting both in terms of the Knowledge Building Communities principles and the contextual issues that were identified and discussed. Kelly noted early in the meeting that her students were becoming bored with the light view and were essentially done with this topic. She indicated that her class was potentially ready
to move on to their next unit of study, Medieval Times or Le Moyen Age (as this was to be studied in French). She stated:

And that’s all ready to go. I’ve got the big questions ready, I just need to build the views or have them build the views.

(Kelly - Site III Study group meeting #2, January 18th, 2006)

With this statement Kelly acknowledged that she had heard the suggestion about granting students more agency over the database but also that it was a structure within which the students had to work. In terms of the generation of new directions, control was still in the hands of the teacher. After some group discussion the teachers decided to continue with the Light & Sound study.

Further group discussion about the principle of Epistemic Agency (#5) revealed that Kelly felt that the granting of more student agency over the Knowledge Forum database wasn’t a good idea for her group. The study group then went on to discuss issues related to the democratization of knowledge (principle #7) in terms of student access into the Knowledge Building that was proceeding in the database. This conversation ranged from talking about how the whole school might be able to become involved in the database to specific problems that could be pursued in the Knowledge Forum database. Chris suggested that it might not be possible to have the same content area being looked at by students in grade one and grade five but that perhaps they could discuss something like social skills. The study group then refocused around their current implementation issues.

In response to my question about progress on the Knowledge Building Discourse principle (#11) Kelly described how she had observed students in her class holding mini Knowledge Building Talks between the students who had the laptop computers out. After some discussion about the nature of the talk that was happening in these groups Kelly committed to observe one or more of these groups the following week and to report back to the study group about the nature of
the discourse that was occurring in these groups. Kelly stated that she felt, “they’re getting that
testing about what they are thinking (is important)” (Kelly – Site III study group meeting #2 –
January 18th, 2006). Also related to the principle of Knowledge Building Discourse (#11) I
suggested that it would be in keeping with this principle if the students in these group discussions
could start to ask questions about the coherency of the views in terms of the ideas that the views
were conveying. This led to a question about how to deal with the messiness of a view. We
discussed several options including simply making the note icons smaller so the notes had more
space between them, all the way to the creation of new views. This in turn led to a conversation
about the effect of removing names from the notes displayed on the view which was a natural
result of decreasing the size of the note icons.

From the conversation about the Knowledge Building Discourse principle (#11) the study
group moved on to talk about the principle of Improvable Ideas (#2). To lead off this episode of
the discussion I asked if there was something that they could do in the classroom to help promote
student ideas to be seen as improvable. I suggested that a bulletin board of the various ideas that
were being worked on would be helpful to students so they could see the ideas that were being
worked on and perhaps the progress that was being made on these ideas. Chris committed to such
a bulletin board of her students research questions. Her bulletin board was to be set up inside her
classroom although the study group discussion suggested that, since the three classes were
working in the same views, that it should be set up in the hallway. Alice again voiced concern
about her class’ ability to participate in the work that had already been started by Kelly’s class and
was soon to be added onto by Chris’ class. Alice touched on the principle of Epistemic Agency
(#5) when she committed to providing her students agency over their questions by having them
work on their questions off of the computer before going onto the Knowledge Forum database.
This strategy also appeared to fit with the process that had been outlined by Kelly during the conjecture meeting so it was not challenged in any way.

Study group meeting #3 began with Kelly reporting that only one of the Knowledge Building Talk groups she had observed actually had been discussing the database in the way she had described during the last study group meeting. Although somewhat disappointed by this finding Kelly later shared how she was trying to get the other groups of students to converse in this way, through the creation of a set of instructions on chart paper, to indicate to her students what they should be doing during Knowledge Forum time. This study group conversation was quite extensive and tracked the multiple steps that Kelly had laid out for the “less self-guided” students to follow. However, prior to engaging in the discussion about the specific steps or the options that Kelly had laid out, the study group discussed some of the student notes that had been created during the previous week. Everyone in the group had read a note about colour that one student had written and all were impressed with the ideas that had been expressed. Chris asked about how to create a new view and how to get the notes from one view into a new view. The group learned how to do this by creating a view and moving some practice notes. Chris also commented on how her class had been trying to come up with questions about sound but that she had been open to them doubling back to the light topic when one of her students had asked a question wondering why dogs were colour blind. Chris also committed that she would try to use the data projector with her class to work on the organization of the notes. However, Chris also indicated that she hadn’t had time during the previous week to do what she had said she was going to do, assign the questions to certain students, a goal that also fit with the design that Kelly had outlined during the conjecture meeting.
Chris observed that her students were not justifying what they were saying in their notes on Knowledge Forum, not in the way they were encouraged to in her normal classroom discussions by using the word “because”. The study group discussed possible options for Chris. I asked if there was something that could be done to the view to support the use of a because-like statement. I suggested possibly writing something into the background of the view while Chris wondered about creating a new scaffold support. The group then learned how to edit the scaffolds list to include a new support. Along with the lesson on scaffolds Chris also asked about sticky note annotations which she had seen Kelly use with her students. The study group learned how to create annotations and discussed the proper use of this means of communication within the Knowledge Forum database. I related both of these database tools, scaffolds and annotations, to the principles of Improvable Ideas (#2) and Constructive Uses of Authoritative Sources (#10).

Ahead of the discussion about Kelly’s list of instructions, I reported back that I had not been successful in figuring out how Knowledge Forum could interact with any of the existing translation programs to support the student Alice had identified as requiring translation assistance. From this report the group moved on to discuss the possibility that Alice’s English as a Second Language student could try using the drawing tools to communicate his ideas. Alice committed to try the drawing tools with this student during the following week. The remainder of the meeting was spent discussing Kelly’s list of instructions. Kelly’s list of instructions included the following possible steps or options that could be taken during Knowledge Forum time in her classroom:

1. Get a laptop and sit in a circle.
2. Spend 10 minutes reading (any) notes in the database.
3. Someone start talking about what they are reading and what they are thinking.
4. Listen to your group members and politely add your thoughts.
5. Pick a note and build on.
6. Agree or disagree with the note and other build ons.
7. Look in your notebook and in other books, magazines and the Internet for information that proves or disproves you point.
8. Write a build on to the note using information to prove or disprove it.
9. Discuss what you found and wrote with your group.

Although there was general agreement that the first six choices would be especially helpful
to the struggling student, and should be done in order, I challenged instruction #7 as not being in
keeping with the principle of Knowledge Building Discourse (#11). Kelly offered to take down
the whole list but I encouraged her just to rethink the wording of instruction #7 such that it allowed
her students to be entering their position on the question or problem without jumping to a
premature judgment. It was also discussed that the first six steps should be done during each
sitting but that the later portion of the list (numbers 7 to 10) were more a list of options to choose
from depending on the notes the students had read, the content of the discussion and the current
status of the view. Alice indicated that her students probably wouldn’t benefit from seeing all ten
steps or options laid out for them so she committed to copy the first six instructions down for use
in her classroom. Alice also stated that she was going to create a separate view for her students to
work on the curriculum topic of Magnetism and Forces. She felt her students needed the
opportunity to work with their ideas outside of the work being done by Kelly’s and Chris’ classes.

Chris reported back that she had created the bulletin board to display the ideas that were
being worked on by members of her class but that she still hadn’t had time to assign the questions
to students. She reported that it had again been a tough week and that she had done some work
with her students but mostly to ensure that she would have something to share during the study
group meeting. Finally, Kelly committed to try to use the data projector in the library so her class
could sort the notes and students into groups.

Study group meeting #4 began with Kelly reporting that the students had been “sorted”
during a whole class session in the library. Alice reported back that her English as a Second
Language student had tried drawing his ideas using the laptop track pad but that it had proven
difficult. There was some discussion about this and the result was that Alice would next give her student a mouse. However, Alice also stated that she felt the student was starting to do well enough through the assistance of other students who were doing some translation for him. Alice also reported that her class had started their work in the Magnetism and Forces view but that she wanted to break them apart into their various questions, again following the design that had been laid out by Kelly during the conjecture meeting. I committed to assist Alice with the creation of these new question views later in the meeting. However, before this occurred there was discussion about technical issues the teachers had encountering with the laptops (e.g. operating system issues), the network (e.g. wireless issues) and with Knowledge Forum (e.g. forgotten passwords & view navigation).

After dealing with some of the technical concerns Chris asked me, “what do you want to know (now)?” This was very surprising as I had thought that all of the members of the study group, by the fourth meeting, understood that I was there to assist them in exploring the implementation of the Knowledge Building Communities model and not just to gather my own data. I responded that I wanted to know what they wanted to know. Kelly interjected that taking the names off of the notes had done a great deal for the principle of Community Knowledge, Collective Responsibility (#6) in her classroom. She stated that it had been quite positive in terms of students being able to be critical about the notes that had been posted in the database.

     When it (a note) doesn’t have a name beside it they are more inclined to look at it critically. We have had a lot more tears since the names came off but the kids are a lot more receptive to the constructive criticism.

     (Kelly - Site III Study group meeting #4, February 15th, 2006)

     The conversation moved back to discussing how to create a new view and how to move notes between views. Kelly took the lead on teaching how this could be done. At one point I admitted that I hadn’t been aware that the database could do one of the things that Kelly had
demonstrated. I took over working with Alice on the basic task of setting up the views that would correspond to the questions that her students were pursuing. Off-handedly, I remarked that it was an interesting design feature they had, that each view was being named after a question. I also asked if the study was really motivating for the students. Chris entered the conversation at this point because of her feeling that the study was over for her students and they didn’t want to continue, especially since the unit test was to be completed the following week. All through this conversation Kelly was listening. At one point Kelly asked in a generative and projective way:

Why did we end up with questions, like for the views why did we end up putting our views with questions? That’s just the way I was told or instructed. That was the way I was told to do it. Like, for instance, if we are doing a study of Medieval Times (next) I could just throw all of my kids into one view and see what happens and subdivide from there.

(Kelly - Site III Study group meeting #4, February 13th, 2006)

This generative insight and projection about a new way of beginning a unit became the topic of the conversation for the balance of study group meeting #4. I then told a story about how some students in another school had begun their units with a blank view. The pattern of the episode that surrounded Kelly’s statement is taken up in a later section of this report. Here I describe how the conversation moved in terms of the experimentation that was proposed and how it related to the Knowledge Building Communities principles. Kelly, Chris and Alice all participated in a conversation about how the Le Moyen Age unit could be started with a blank view with no list of questions being generated off of the computer. This idea clearly excited all of the participants. I interjected that I thought Alice could recover her own class’ beginning in the Magnetism and Forces view by allowing them to work in one view as we had only just created the new set of views for her class’ set of questions. Chris stated that she felt they were talking about how a new unit would be started, not an existing one reworked. I pressed on with trying to get the group to rework Alice’s set of views to fit with what they were discussing but network problems stopped us
from being able to do this during the meeting. Regardless, this episode clearly had an effect on the teachers and was referenced in their post interviews as Kelly made a commitment to begin her class’ Le Moyen Age study the following week in the way she had described.

The final retrospective meeting was held on February 23rd and focused on the implementation of the Knowledge Building Communities in these classrooms and the functioning of the study group over the course of the meetings. In particular, the importance of the Knowledge Building Communities principles to the study group meeting discourse was discussed as was the organization and timing of the meetings. These results are presented in later sections related to a new design for Site III and the functioning of the study groups. Table 9 summarizes the frequency of direct references to the Knowledge Building Communities principles during the meetings, the self-reported valuing of the Knowledge Building Communities principles by the teachers with respect to their perceived knowledge of each principle and the overall value they assigned to the principle to the Knowledge Building Communities model. As indicated previously, the teachers at Site III had identified the principles of Improvable Ideas (#2), Epistemic Agency (#5), Democratizing Knowledge (#7) and Knowledge Building Discourse (#11) as the main aspects of the Knowledge Building Communities model that they wanted to focus on during the meetings. This focus was spurred on by a discussion during the conjecture meeting about student access to the Knowledge Forum database. Again the concern was that some of the students were new Canadians and hadn’t yet developed strong English or French skills. There was also a concern expressed that some students might not see their own ideas as improvable. This concern built mainly from the teachers’ perceptions about the main goals of the Knowledge Building Communities model, as they understood them to be at that point in time. In the post interview the teachers were given back their initial Knowledge Building Communities principles ratings (see
Appendixes C, D and E) and were asked to change it (up or down) or leave it the same as their initial rating. One of the participants (Kelly) was asked to perform the post-rating task, without the aid of seeing her pre interview rating, and completed it with 83% reliability ($r = 0.83$). The results of this combined table (see Table 9) suggest that even though the teachers were all engaged in the same activity, implementing the Knowledge Building Communities model in their classrooms, that their experiences and their perceived gains on an individual level were unique to their own experience. Each of the embedded teacher cases is presented separately in the next section. The principles that were identified as focal principles by the study group at Site III were also the principles that were explicitly discussed during the meetings (see Figure 36).
Figure 36. Site III - Explicit references to KB principles by meeting

Figure 37. Site III - Explicit References to principles by participant. Range is 0 to 6.
All of these principles were associated with a problem that was taken up by the group and each was linked with a specific action that was taken by a teacher to change their practices related to the Knowledge Building Communities model. For instance, in study group meeting #2 Kelly focused on improving how Knowledge Building Discourse (#11) occurred in her classroom, while Chris tried to help students see their ideas as improvable by suggesting that she would display them in the classroom, and finally Alice focused on making sure all of her students, even those that had limited language skills, could find a way into the Knowledge Building occurring in the database (Democratizing Knowledge - principle #7). Although the Epistemic Agency principle (#5) was explicitly discussed in each of the four meetings, it was only in the final meeting that Kelly had her insight into how she had been limiting student agency over their ideas by defining views with an overarching question. Figure 37 shows that the explicit references to the underlying principles came from either me as someone who had knowledge of the reform message or a teacher (e.g. Kelly) who has had prior experience with the theory.

A Chronologically-ordered Diagram (CORD) plot is used to gather together the codes as well as any overlap between the types of questions, stories and references to the Knowledge Building Communities principles that were mentioned explicitly during this meeting episode.

A new design for KBC at Site III

In the follow-up retrospective meeting the Site III teachers identified several features that they felt would assist others in taking up the Knowledge Building Communities model at their school site. The first recommendation was that if teachers were to work across classes then these classes should start together and work in concert. The second was that students should be encouraged to get their ideas right into the database and not use sticky notes first. Kelly, who had defined the Site III design during the conjecture meeting, was the primary supporter of this
changed approach regarding a new way to start Knowledge Building at Site III. In the following segment from the meeting Kelly links this new way of starting to the principle of Improvable Ideas (#2).

(Start) on the database first, not (with) stickies. Because they need to see their ideas there and realize that first of all that their ideas are there— which I realize it’s a different principle (Epistemic Agency #5) — but that it’s there and because they’re accustomed to the idea of Knowledge Building, they know that because it’s there it’s, um, improvable. They can change it.

(Site III - Retrospective study group meeting, February 23rd, 2006)

Also during the retrospective meeting Kelly discussed the naming of views. In the past she had named the view a question, because that had been how she had been taught. Following her “aha” moment in meeting #4 her perceived understanding of several of the principles seemed to be altered. She stated that her new approach would be to not use a question as a title for a view.

Because (now) I don’t think that one question can represent all of their questions that the kids have inside. Their ideas are too diverse to be put under one question. They can be under one heading, like illness or something like that, but I wouldn’t (even do that).

(Site III - Retrospective study group meeting, February 23rd, 2006)

Chris, also during the follow-up retrospective meeting, agreed with Kelly about skipping over the post-it note stage that had been defined during the conjecture meeting. Chris felt that dealing with the “disorder” before “assigning” questions would be a good thing for the students and that she would do this next time she worked with students on the database.

The next time I do it I will probably also do the same way as just posting everything on there first of all, but then as we go through and as we organize that, then okay, what questions do we still have. Then I’ll probably add onto it that way, because that helped them get a focus and take charge. So I’d wait and have all the disorder at first and then once we organized, put in some of the assigning a question to someone. They responded well to it, they liked that part of it.

(Site III - Retrospective study group meeting, February 23rd, 2006)
Alice, during the retrospective meeting, also relates that she could see the merits of starting with a clear view and letting the students put their ideas forward without being forced into any one category. She stated:

That’s why I really liked Kelly’s ideas of just starting an empty view. Because I tried the question strategy, but I found, they were into it at the time, coming up with their questions, and they all took a question that they wanted to take on, when it actually came time to them reading notes related to their question based in Kelly’s database and Chris’s database, that wasn’t what they were interested in. They felt that they had to then follow what their name was assigned to. So as opposed to them just finding something that they’re interested in and responding to it and building that way, I felt for my group anyway, it would have been an easier way for them to access the database as opposed to them, you know, how does sound travel and how does light travel. For me personally I would try it, the way Kelly suggested. Just opening up a topic and, you know, write down what your ideas are, write down what your questions are, and then having them build that way, because they got a kick out of someone responding to what they had started.

(Site III - Retrospective study group meeting, February 23rd, 2006)

The findings for the Site III study group suggest that these meetings, in combination with the experimenting with ways of implementing the model, may have influenced the teachers’ collective practices and their perceived understandings of the Knowledge Building Communities model. The following embedded cases studies of the teachers in the Site III study group are intended to examine further the proposition that the study group meetings may have influenced the teacher’s perceived understanding of the Knowledge Building Communities model and their associated classroom practices. Student data is only presented for Kelly as she made the most extensive use of the database. A summary for all three teachers is provided at the end of this section about the embedded teacher case studies for Site III.
Embedded teacher case studies – Site III

*Embedded teacher case study - Chris*

**Background**

Chris was a new teacher to Site III but had been a teacher for three years. This was her first experience with Knowledge Building and Knowledge Forum. Upon being hired at Site III Chris had been invited the year before to see what the classrooms at Site III were doing with the Knowledge Forum software. She stated in her pre-interview that she had got to see a Knowledge Building Communities in action but that she didn’t know how the model was being specifically worked out in the Site III context. She described her previous teaching practices in the following way:

I had, in my previous years, there were group discussions, so it might be up to the students to talk together in small groups or as a whole class. I was very big on talking about what it is that we’re learning, and asking questions, and then, ‘okay, now that we’ve come up with these questions, let’s break up into groups to try to find the answers to these questions.’ So we sort of did it verbally but without the computer.

*(Chris – Pre-interview, January 2006)*

It is clear that Chris’ orientation to this way of teaching was primarily through the use of the Knowledge Forum software. Further evidence regarding Chris’ limited understanding of the Knowledge Building Communities model was revealed during her pre-interview. At one point Chris’ pre-interview was interrupted and when it resumed there was confusion about which of the principles she had been discussing.

Chris: Okay, because I really don’t know what else to say! Okay. Collective responsibility, oh, we’ve done this one.

UR: Is that one—

Chris: Yeah, that’s the one we skipped to.

UR: Oh, I thought that was Democratizing (Knowledge).
Chris: We did both.

UR: We did both?

Chris: I’m pretty sure we did… Maybe we didn’t do both.  

(Chris –Pre-interview, January 2006)

Chris viewed Democratizing Knowledge (#7) and Community Knowledge, Collective Responsibility (#6) as being essentially the same principle. Chris summarizes the theory in one sentence, “they all seemed to be about working together.” In her post interview Chris admitted that she really didn’t know anything about the model when she was discussing it during the pre-interview.

*Contextual Concerns*

Chris indicated in her pre-interview that she had no real concerns either for the curriculum or her students’ abilities to participate in a classroom that followed the Knowledge Building Communities model. She responded in the following way in her pre-interview.

UR: Do you anticipate that all the members of your class will be able to participate in the Knowledge Building Community? Do you have any concerns?

CHRIS: No—

UR: In participation—

CHRIS: No, I don’t.  

(Chris - Pre-interview, January 2006)

Chris linked both her students’ abilities and the curriculum content area in the next statement, essentially indicating that she saw no real issue with getting her students to engage in reading and writing in the database.

CHRIS: Based on what I’ve seen, my students will be fine with it. The way that Light and Sound is formatted right now. My grade fours will not have a problem getting right in there.  

(Chris - Pre-interview, January 2006)
Experimentation/Problem solving

Chris actively engaged in two experiments that she discussed during second and third study group meetings. First she worked on creating a bulletin board so her students would be able to see their ideas up in the classroom. This was done in an attempt to help her students see their ideas as improvable and also to assist the group with getting resources for each of the questions. This experiment was then associated with both the principle of Improvable Ideas (#2) and also the principle of Constructive Uses of Authoritative Sources (#10) although in a similar way to Site II the application of the principle was not about constructive critique of the resources. The basic organization of how Chris reported operating her class as a Knowledge Building Community was presented in the following note that she entered in the Knowledge Forum database.

We have created 4 questions on light and sound and the students have paired up to research the answers. They are very excited about this new task. For next week, we are going to work on backing up their ideas based on classroom experiments, Internet sites and books. Our major focus will be using "because" statements to defend theories.

(Chris - Database entry, February 2\textsuperscript{nd}, 2006)

As the note indicates the task was to answer the questions by backing up their answers with experiments, websites and books. This note also suggests that the students are being encouraged to work on a task, assigned by the teacher, instead of a problem that is self-motivated and leading forward. Through interaction with the study group Chris’ approach changed by the end of the study. The final sentence references the other experiment that Chris initiated in her classroom, the creation of a “because” scaffold for students to use to indicate what support they might have for their assertions.
**Teacher change**

From Chris’ participation in the meetings, along with her post interview description of the Knowledge Building Communities model (see Table 10), it is clear that she framed the model primarily in terms of technology. As Spillane and his colleagues have noted (2002) people use prior knowledge to frame and interpret new information that is coming to them. In Chris’ case it appears that she saw the technology and framed the Knowledge Building Communities model in terms that made the approach, for her, about using the software correctly. Chris’ main change in terms of her sense about the fit between her previous practices and the work she did with Knowledge Building in her classroom was that it was now more “on-line”. This statement fit with her focus on the software as was indicated by the nature of her participation in the meeting dialogues.

I feel that through our discussions and through the things that we were doing, that a lot of what we were doing, was very similar to it (the way she taught before). Just this time it was more an on-line kind of thing.

(Chris - Pre-interview, January 2006)

This tendency to view a new innovation through a lens that suggests the new approach is similar to the way we are already doing things is well documented in the literature and represents an enduring way that teachers approach new innovations, as versions of something they already do (Spillane et al, 2002). In this respect Chris is no different than other teachers who have encountered the Knowledge Building Communities model as she interpreted the new approach predominantly around the use of the Knowledge Forum technology.
Table 10.

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<th>Pre and post Knowledge Building Communities principles statement - Chris</th>
<th>Pre</th>
<th>Post</th>
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<td>Okay. So, the Knowledge Building, through Knowledge Forum, is basically on the computer the students post a question and then they might state their own theory as to what the answer is, but the other students will then look through to find what they think as well, based on…they can research to prove their theories, and continue discussion from there to build some higher level of thinking.</td>
<td>It’s really great, because first of all we have laptops brought into the classroom, and it’s a big thing, and it’s a funny way to incorporate technology into anything you’re doing. So the fact that you’re incorporating technology and linking it to other aspects of the curriculum, through—what we were doing, science—and encouraging a higher level of thinking, in the sense of looking through beyond curriculum, what do you still want to know, and then all the other kids add on to it. So instead of having a conversation in a community circle, they’re doing it online through a sort of spider web format.</td>
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Between the pre and post Knowledge Building Communities principles statements (see Table 10) there is little movement in her understanding of the Knowledge Building Communities model. In the beginning Chris equated Knowledge Building solely with the use of Knowledge Forum. Her understanding of the concept was very much tied to the structure of the database and had a question-and-answer feel to it. Resource work is important to Chris’ definition and she links all of it to what she describes as higher-order thinking skills. When asked, Chris indicated that she doesn’t feel she understood the Knowledge Building Communities model and equates this lack of understanding with not knowing how to operate the software.

In her post interview Chris stated that she has “no knowledge” about Knowledge Building Communities principles #5, #8, #9, and #12. Principles #8 (Symmetric Knowledge Advancement) and #9 (Pervasive Knowledge Building) have been demonstrated to be semantically more remote from the rest of the theory (Reeve & Teplovs, 2008) and consistently were rated lower by teachers across all of the sites. However, principle #5 (Epistemic Agency) was a focal principle for this group and was mentioned explicitly on six separate occasions. This suggests that even though the term was being discussed, Chris had not constructed any meaning
around it. Also, because her class wasn’t able to use the Knowledge Forum database as much as
the other classes Chris had less opportunity to test in practice her understanding of this and the
other principles. This in itself is a concern but it also suggests that Chris may not have
understood what the study group was trying to work out and fell back on the most salient
element, the Knowledge Forum software. For Chris, it appears that the goal of trying to get
everyone to have a question that would make a positive contribution became the focus for her,
along with learning to use the software. She also self-reported an improvement in understanding
principle #1 (Real Ideas, Authentic Problems) that was discussed once in the fourth meeting and
principle #3 (Idea Diversity) which was never explicitly discussed. The problem Chris tried to
move forward on was how to get student questions out into the class environment so they could
be seen by other students and they could assist with getting more resources for these questions.
With respect to the principle associated with this problem (#12 - Constructive Uses of
Authoritative Sources), Chris reported a change in her valuing and knowledge of this principle.

In her summary, Chris highlighted the use of the software environment as the primary
feature of a Knowledge Building Community. The two new ideas that Chris incorporated into
her description of the Knowledge Building Communities model is that it incorporates
conversation and that the work of the students can go beyond the curriculum. These are
significant changes and the conversations she reports having with her students may account for
the addition of conversation to her description. However, there is no evidence in what she
reported doing in the classroom that would have contributed to the change in her view of the
curriculum which suggests it may have come from the study group discussion.
Embedded teacher case study - Alice

Background

This was Alice’s first year teaching and therefore should have been her first experience with Knowledge Building. However Alice had been involved in Knowledge Building Communities research projects during her teacher education program; however, Alice didn’t feel she knew the principles very well. She was especially concerned about her understanding of the Knowledge Forum software. In her initial interview Alice indicated that she felt learning the underlying principles was going to be important. Alice’s previous experience with Knowledge Building was in relationship to a research group that she attended during her undergraduate practicum when she was a student-researcher. She felt that the theory was not at the forefront of those discussions and that the overall goal of those meetings was one of grafting Knowledge Building and the use of Knowledge Forum onto a math program.

It’s hard to say because I don’t feel like I know what the theory is behind it. It’s just basically been from exposure that I have some understanding of what the principles are behind it. It wasn’t at the forefront per se in the math project.

(Alice – Pre-interview January 2006)

Contextual Concerns

Alice identified in her pre-interview that her main concern was how to get all of her students fully participating in the Knowledge Building Community she was developing in her classroom.

But to my class, they have a range of abilities so it’s…I’m intrigued to see how I’ll make it accessible for all of them. That’s my main one concern.

(Alice - Pre-interview January 2006)

Alice goes on to say that she also has concerns about her students’ abilities with respect to thinking and communicating.
Right now their problem solving isn’t very good, and their explanation of their thinking, they don’t like to explain what they’re thinking. They like to come up with the answer, but they don’t like to engage in those kind of conversations. So I’m intrigued to see if a different forum will alleviate some of that question—I don’t know if it’s just orally they don’t like to share, because then they know at that moment judgments are being made and in the group they have to actually defend what they’re saying. It’s a little bit more removed in Knowledge Forum where they can post something and then go back to it and people are responding to it but it’s…you’re removed from it in time. So I’m intrigued. 

(Alice – Pre-interview January 2006)

It is interesting to note that Alice views the Knowledge Forum database as a format for communication that may actually help her students with the communication of their ideas. This is similar to the position taken by Don in Site II. Alice does have concern for one student who is a new Canadian that she feels may need a translator or some way of communicating during the inquiry.

(O)ne English as a Second Language student, who is very early stage one, and just language ability—if we can get a translator who can kind of explain what we’re doing. He’s very reluctant to speak outside the area of the math, so I’m hoping that it’s accessible for him as well. 

(Alice – Pre-interview January 2006)

Experimentation/Problem solving

Alice participated directly in at least three problems that she took back to her classroom to work on and report back to the study group. All three were associated with the providing democratic access to the database for the range of students she had in her classroom. The first problem she worked on was how to get full participation by all of the students in her class including the student who was new to Canada and didn’t like to speak English. To do this Alice instituted a type of group talk referred to as Knowledge Building Talk where everyone sits in a circle and has to listen to what the other members of the group are saying. Here is her description of what she tried in her classroom.

Well, we’re continuing with our light and sound unit and this past week I started doing (Knowledge Building Talk) with the kids, orally…and I started off with just the threes, so
a group nine, just to get them used to the idea, and we actually had a physical object that they could not speak unless they had this object, because they have this tendency to talk over each other instead of actually listening to the idea, and the novelty was really good for them, because it actually had them listening to what they were saying and they had to be building on to what the first original person said, and I participated in and so did the members of the small group, but when I tried to extend it to the full class, what was an issue for me, I have some students in my class…so there’s no accountability for them in a way, so I’m trying to struggle with how do I make them accountable for participating in the conversation that’s happening.

(Alice – Site III study group meeting #2, January 2006)

Alice seeks to solve the accountability problem she encountered by moving to whole class talks by keeping these discussions to a smaller number. In this way she is addressing the contextual concern she encountered and also addressed the Knowledge Building Communities principle of providing a forum for students to engage in Knowledge Building Discourse (principle #11).

The problem of access for the English as a Second Language students was actually addressed on two separate occasions through two different means. In the first attempt the study group discussed if the database itself could somehow translate and display Chinese characters or at least allow the student to type the Chinese characters into the database. Ultimately it was found that there was no way to have the database display Chinese characters in the version of Knowledge Forum that was being used at Site III. As a result the group then discussed trying to have the student draw his ideas using the drawing tool that was built into the version of Knowledge Forum being used at Site III. Alice experimented with this solution but found that the student found drawing with a track pad to be quite difficult and this solution was abandoned as well. However, Alice’s experimentation with ways of improving democracy in her classroom, such that all students could find their way into the inquiry, appears to have been instrumental in changing Alice’s perceptions about the importance of this Knowledge Building Communities principle and potentially other associated principles. For instance the following excerpt from
Alice’s post interview indicates her sense about the link between the nature of the discourse in the classroom and her view of ideas as being improvable.

Well, I used the suggestion of (Knowledge Building Talk) within in my classroom itself, so just starting orally, as a group, in a circle on the carpet, and they could have been about any topic, didn’t necessarily have to be about light and sound, but really pushing them to start thinking about their ideas and why are you thinking that, can you explain more. And having them start to question each other a lot more, and so I found that when I took myself out of the teacher role, where I had to—not had to but they kept looking at me to control the process—but when I became another student who had their hand up, who was trying to share in the conversation, the onus really was on them to either include me or include my ideas or discount my ideas as well, so…the subtle shift in power when they have to start doing it, so they naturally started to question each other, and you’d see all these hands start to go up, and so just getting them more comfortable with that, that they could question each other, they could question me, and that I don’t have to necessarily say the right answer, and that someone could build on.

(Alice – Post Interview - March 2006)

Teacher change

In her post interview Alice correctly identified the four focal principles for the Site III study group and she self-reported gains in understanding and valuing of all four of these principles. Alice also reported that principle #8 (Symmetric Knowledge Advancement) was a focal principle for the group despite it never being mentioned explicitly during the core set of meetings. This is even more surprising given that the Symmetric Knowledge Advancement principle (#8) is reported to be one of the least well understood of the Knowledge Building Communities principles. Closer examination of Alice’s reasoning reveals that the issues that she was dealing with in her classroom may have led her to feeling this was a principle of concern for her.

Specifically, she had been required to have her students join the Light and Sound views in the database after the other two classes had already begun working in those views. This created a dissonance for her in terms of the symmetry of advancements in knowledge being gained by the three different classes. It appears that this focus led her to consider this issue and to suggest in the retrospective meeting that classes should either start together or work separately to help avoid this
uneven and unpleasant experience. Although not the intended definition of Symmetric Knowledge Advancement (#8), Alice applied her own meaning to this principle, symmetry between classes in the same database, and expressed advancing her understanding of it.

The other interesting move for Alice was in her understanding and valuing of principle #12 (Embedded and Transformative Assessment). Again, this was neither a focal principle nor one that was referenced during the meetings but she did report bringing resources into the classroom in response to students’ questions, which may have triggered this change in the valuing of this principle in relationship to the overall Knowledge Building Communities model. Table 11 presents Alice’s pre and post statements about her understanding of the Knowledge Building Communities model. In her post statement Alice has less focus on democratic access and basic skills for students and more of a sense that Knowledge Building is about the class having a common goal, with pockets of people being able to focus on different parts of the study. This is a change for Alice and signals the importance of the diversity of ideas for her. A similar emphasis for building on as a means of improving ideas is conveyed in her post description. It is also interesting that in the pre-interview Alice refers to Knowledge Building as Knowledge Forum, thereby invoking a technology frame. Alice was very concerned that even though she had been seeking assistance from Kelly that her level of knowledge about the technology was a determinant in how her students would be able to proceed with the Knowledge Building. From this observation she made the following statement about student agency.

So it’s a learning curve for me as well, but unfortunately my students have to learn with me guiding them along with the overarching structure of it because ultimately they’re not part of that part of the system, so they don’t have agency over that, so that is limiting. If the teacher does not know enough about the program and what’s out there, I can’t give that to my students. So what Kelly’s students are receiving in this classroom is going to be vastly different from what they’re getting in there, because she has more knowledge about it. But as time goes on, hopefully, it will start improving in there as well.

(Alice - Post Interview, March 2006)
Table 11.

*Pre and Post KBC Principles Statements - Alice*

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<td>ALICE: Well, for me, I would think that it’s equal access for all learners. Regardless of their language abilities or learning abilities or styles. Where they start with their own ideas, so it’s self generated—it doesn’t mean that you’re not giving them information—but it’s very much self-empowering in that the onus is on them to come up with the original idea and then to move forward from it and build it together as a group, which means that they all have to be participating in it, and they all have to feel like they’re safe participating in that it’s an open forum where they can share and voice their ideas, which means that they need those skills, they need to be able to know how to question each other in a respectful way, how to gather information, how to summarize it, present it in their own way, and build from there. And really just start with an idea and let it grow and see where it progresses.</td>
<td>ALICE: A group of people who have a goal in mind of something they want to explore, learn about, they have ideas that they come in with but the whole point is to build on it and so they discuss it, either through, you know, oral communication or using the computer, looking at ideas that have come before them, ideas that they’re generating on their own, and really building on things that they started with so that they’re moving towards this common understanding of this topic, whatever it may be. And it doesn’t mean that within that topic you’re not going to have smaller groups who may kind of separate from the pack because they’re pursuing something a little more isolated, but as a whole, you’re really sharing this information so that you’re moving beyond the knowledge that you started with…</td>
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In study group meeting #3 Alice reported back that the drawing idea hadn’t worked because of the laptop’s track pad, a mouse is then suggested and tried but ultimately student support in the classroom prevailed in assisting the student. In this series of experiments Alice was engaged in actually trying to democratize the classroom so that all of her students, and in particular this new student, could be full participants in this developing Knowledge Building Community. It is not far to draw a line between this experience and why she reports in her post interview to an increase in understanding and in the importance of principle #7 (Democratizing Knowledge) to the functioning of a Knowledge Building Community. Despite the difficulties that Alice reported regarding the implementation of the Knowledge Building Communities model (e.g. technical issues) it is clear that she made gains in her perceived understanding of the Knowledge Building Communities model and in particular those principles that were a focus of the study group meetings.
Embedded teacher case study - Kelly

Background

Kelly was the most experienced teacher in the Site III study group with respect to the Knowledge Building Communities model as she had been using the Knowledge Forum software for the previous two years. In addition, Kelly had used the software in her Bachelor of Education program but she readily admitted that it hadn’t been used for Knowledge Building as she understood it. She states in her pre interview the system was used as a bulletin board and that she had no idea at the time that there was a more powerful way of using it. In her pre-interview Kelly talked also about the importance of her experiences at the Knowledge Building Summer Institute, which she had attended for one week during the previous three summers.

UR: Three summer institutes, okay. Did they help, how did they help you to understand the Knowledge Building concept?

KELLY: I think gradually they helped me understand that it wasn’t something that you could artificially pick up and sit down in your classroom, that this was something that had to grow. That you couldn’t just sort of open, take it out of the box and use it. You have to crash and burn, once or twice first, before you fully understand what’s going to happen next.

(Kelly – Pre-interview, January 2006)

In this statement she indicates that the Summer Institute helped her to realize the complexity of the model, but also that these experiences didn’t help her with the details of how to go about implementing the model in her specific classroom. To learn this she felt she needed to try it out and experiment with in her own teaching context.

During her pre-interview Kelly stated that she looked forward to participating in the study group as she felt that her Knowledge Building Communities practices had “hit a wall” and that she needed help moving to the next level. However, Kelly also reported in her pre-interview that she felt her previous practices were very close to the Knowledge Building model.
UR: How close were your previous practices?

KELLY: Very close! I think I understand it relatively well. I’m not a theory-based person, so in terms of having to go and describe the principles and things like that, I can’t. But—

UR: But the approach itself.

KELLY: The approach to using it? I think I’ve got it now. At least what works for me.

(Kelly – Pre-interview, January 2006)

Kelly describes the approach as being personally meaningful and her perception of what the approach entails she feels is close to how she has been practicing it. This perception changes significantly in her post interview as a result of the conversations that take place in the study group meetings and the experimentation that she does in her class.

When asked in her pre-interview what she feels she needs to focus on most in order to move forward, Kelly stated that it is was a lack of skill with the software and not her understanding of the model that needs to be improved. During her pre-interview she was also offered the opportunity to learn about how others had put the Knowledge Building Communities model and Knowledge Forum software into practice but she declined and said it was the software that she felt was her main need.

I need to fool around with the software a little more. I’m okay with the theory, I’m okay with (the) principles, and I know how I’m going to implement it in my class. That I think I’ve got under control. I need to go further with playing with the software.

(Kelly – Pre-interview, January 2006)

Contextual Concerns

One theme that came through in Kelly’s pre-interview was her sense that the curriculum was a static impediment that stood in the way of implementing the Knowledge Building Communities model in an ideal way.

Well, in terms of Real Ideas, Authentic Problems (principle #1), here because we’re constrained with the curriculum, it’s locally not as applicable as it would be in an ideal situation. I think that (it) comes down to the limited subject matter. I’m going to use
medieval times (as an example) just because I have in the past and I’m (going) to use it. Because the study that we’re doing is defined by the unit of study, they don’t get to spread out a whole lot. When we get down to it if they get into things that, say they’re studying the plague, and they get into other diseases and things like that, that works, that’s fine with me. I’m not going to stop that. But if they start talking about tornadoes, then we’ll have to start another view about tornadoes. It limits where they’re able to go. (Kelly – Pre-interview, January 2006)

Kelly’s sense is that the diversity of the topics that the students can get into is limited by the focus that is defined by the curriculum. The other contextual constraint that she identified is the limited availability of computers for her students to use. Kelly stated that she appreciates that her and the other teachers have worked out a system for how to share this resource equitably but that it is still seen as a potential concern with respect to her ability to implement the Knowledge Building Communities model.

Experimentation/Problem solving

Kelly participated in all of the study group conversations about the problems that were undertaken by the teachers in the Site III study group (see Table 8). Within her own classroom she directly engaged in actions associated with two specific problems. The first was to engage in a micro study of how Knowledge Building Discourse (principle #11) was being carried out by her students during class time and to see if the format could be improved. She found that her students were engaging in a form of Knowledge Building Discourse (principle #11) while they were gathered together looking at the database. Her story about this way of working and its relationship to the Knowledge Building Communities principles was discussed in meeting #4.

The other problem that Kelly engaged in arose from her response to a discussion that Chris and I were having about the naming of Alice’s new view in the Knowledge Forum database. Kelly’s actions associated with this problem extended beyond the set of core meetings but its genesis and connection to the Knowledge Building Communities principles is clearly linked to the content of
meeting #4. This change and the actions associated with this change are presented in the next section.

Teacher change

By the post interview Kelly admitted that her perception about her understanding of the Knowledge Building Communities model at the beginning of the study had been over-rated.

I thought that’s where I should have been. Now I realize that if looking back on that now, I should have been down here again (lower on the scale). Somewhere between around a two.

Because I didn’t get it. I thought I got it, I didn’t get it.

(Kelly – Post interview, March 2006)

Through her participation in the meetings and attempts to change her practice she also changed her views about how closely her previous practices were to Knowledge Building.

I’m realizing now that the way that I had been taught to start is not necessarily the most effective way to start. I’m not suggesting that it doesn’t work for other teachers, but it doesn’t work for me, and in my classroom community environment.

(Kelly – Post interview, March 2006)

Also in the post interview Kelly went further to say that her contact with the principles as juxtaposed with the actual implementation that she was encountering created a conflict in her about whether she was on the right track.

Well, it’s…something felt off. Before it felt like I was forcing it too much. Now, it’s much more comfortable. It’s much more…it’s easy for me to see where they’re going with this, as opposed to trying to force them down a road, which is the way I was feeling and I kept thinking that this can’t be right, because what the principles were talking about was not what I was feeling. I know that they’re important, but I couldn’t see a way around it.

(Kelly – Post interview, March 2006)

Kelly moved from a way of starting that had her creating the view and giving the view direction to allowing the students to begin with a blank view in the Knowledge Forum database. Kelly saw the release of agency that she had manifested by starting with a blank view as being something
that was new to her in her practices associated with implementing the Knowledge Building Communities model. Kelly’s understanding of the principle of Epistemic Agency (principle #5) is associated with her change in practice. She indicates that it was through a change in practice that she experienced an “aha moment” of seeing student agency at work.

This was a big “aha” moment, because I basically, I moved the mouse (in the computer lab with her students) and pointed them in directions on what we were going to do, but essentially they decided what the view was going to be named. And they decided where to put the notes.

(Kelly – Post interview, March 2006)

As indicated earlier a key experience for Kelly came in study group meeting #4 when she was listening to the other members discussing the technique of naming a view a question, a design feature that Kelly had put in place during the conjecture meeting, when she shared how they typically did Knowledge Building at Site III. Several segments from Kelly’s post interview point to study group meeting #4 as the point that created the dissonance for her and prompted the proposal to start Knowledge Building in a different way.

The talk around, when Alice was re-doing her views. I think was the moment (my), wait a second here, maybe I’ve been doing this all wrong right from the beginning. And I decided to change from the sticky note process to them actually being in the view and putting their notes up.

During the meeting (#4) is when I had the “aha” moment…what came after that was figuring out how I was going to let that happen, came in the car driving home, at home, the next day at school. It was a real thought process. I had a lot of thinking-out to do.

I think it was the discussions about our focus on the principles that ended up starting a little tidal wave that happened in my brain. Like wait a second, this can’t be right. And I mean that’s the fifth or sixth time that I’ve been through, no, fourth or fifth, that I’ve been through that type of meeting, at the summer institute or what have you. And it was just through the repetition and through the discussion with the others that it sort of went “ding!”

(Kelly – Post interview, March 2006)
Table 12.

*Pre and Post KBC principles statements - Kelly*

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>KELLY: It is a community in which the students take control of coming up with their own ideas, the things that they want to study and learn about, and they work together as a community to develop answers and further theories and more questions about topics which interest them … Using the Knowledge Building software, and having Knowledge Building Discourse.</td>
<td>KELLY: It’s about the kids taking control of their own learning, by studying things that interest them, using the software and the Internet and books, and going further than, or outside of, the Ontario curriculum as a whole, but not disregarding the curriculum. They still do things from the curriculum, but they use that as a jump off point and actually go deeper into their learning.</td>
</tr>
</tbody>
</table>

However, when asked directly about what was different about the fourth meeting Kelly couldn’t recall a difference only that it had had a big effect on her.

I don’t recall anything different happening during the (fourth) meeting.

(Kelly – Post interview, March 2006)

Table 12 presents Kelly’s pre and post statements about her understanding regarding the Knowledge Building Communities model. A key change in her thinking about the Knowledge Building Communities model is that it is more student-controlled. She indicates that she feels the Knowledge Building Communities model can go beyond the curriculum, which she had originally seen as an impediment, and that she students were able to use the curriculum as a jumping off point for what they needed to understand.

At several points during the study group meetings the group discussed the possible need to customize or adapt the Knowledge Building Communities model in order to make it work at Site III. Again, it has been reported that this is more often the rule than the exception (Supovitz & Weinbaum, 2008) in the implementation of new approaches. In the pre and post interviews the teachers were asked if they anticipated a need for customizations to ensure a successful implementation of the Knowledge Building Communities model. In her pre-interview Kelly had felt it was the Knowledge Building Communities model that would need to be customized to fit with the context of her school. However, after her engagement with the study...
group, and her attempts at implementing the approach in her classroom context, Kelly changed her opinion about what needed to be customized in order to allow for the KBC model to be put into practice in closer accordance with the Knowledge Building Communities principles:

KELLY: From my standpoint it was a higher comfort level in just letting go of the control. Other years I felt that I needed to control the issue more.

UR: So you customized yourself?

KELLY: I customized myself.  

(Kelly – Post interview, March 2006)

Then Kelly went on to state:

It was me who had to change.  It wasn’t the kids, and it wasn’t the software.  But it was my views and how I looked at things that needed to change.  

(Kelly – Post interview, March 2006)

Kelly changed her valuing of the principle of Knowledge Building Discourse (#11) down as a result of her experiences in changing how Knowledge Building happened in her classroom. This may have been a result of her increased appreciation for the importance of the other principles, which rose as a result of her involvement in the study group and her attempts to make Knowledge Building work more effectively in her classroom.

The principle (Knowledge Building Discourse - principle #11) is still important. I just don’t think it’s the be all and end all.  

(Kelly – Post interview, March 2006)

In her post interview Kelly also focused on the principle of Improvable Ideas (#2) that she felt is related to the Knowledge Building Discourse principle (#11). Kelly reported that by releasing agency to the students to communicate in a different way she found that the students’ views about the improvability of their ideas also changed.

It’s the kids seeing their ideas as improvable, as opposed to me basically dictating what they need to do.  

(Kelly – Post interview, March 2006)
According to Kelly her understanding of principle #10 (Constructive Uses of Authoritative Sources) didn’t change but she expressed a desire to improve her focus on it in the future.

We’re working on that with the kids. I understand it. I know that it’s using things from appropriate places, you know, being careful about what you’re reading on the Internet. Using books and speaking to people, I would love to have them do interviews.

(Kelly – Post interview, March 2006)

The other principle that Kelly reported a reduced valuing of was that of Symmetric Knowledge Advancement (#8). This reduction is most likely as a result of the negative experience reported by Alice about her students being unable to become involved in the Light and Sound views. In the retrospective meeting the study group decided to make, not working together if classes don’t start together, part of the recommendations for approaching the Knowledge Building Communities model at Site III. When asked in her post interview about Symmetric Knowledge Advancement (#8), and after she had related her story of releasing agency, Kelly began to associate this principle to the practical experiences she had during the study group period.

I sort of get it and I don’t really get it. I think that’s what I was trying to do with all of the grade four classes. I think that if it went down, which it probably did (it did) - It went down? It’s probably due to the challenges that we experienced trying to get it to happen, between classes.

(Kelly – Post interview, March 2006)

It is apparent that the actions that Kelly took with respect to releasing agency to her students affected her understanding of the underlying principles of the Knowledge Building Communities model. Kelly moved to viewing the release of agency that she manifested by starting with a blank view as being something that was brand new for her and the practices she associated with implementing the Knowledge Building Communities model. Here she describes how she started the Le Moyen Age study with her students.

UR: You literally started with the blank view?
KELLY: We didn’t even have a title for the view, technically.

UR: And you were okay with that? But that was brand new to you?

KELLY: That was brand new to me.  

(Kelly – Post interview, March 2006)

The change that occurred in relationship to her understanding and practices associated with Epistemic Agency (#5) is central to her story but other changes also took place. For instance, Kelly felt she was beginning to understand Rise Above (#4) although she still did not use the structure of the rise above note with her class nor did the study group discuss this principle. Kelly had actually set rise above as one of her personal goals. This suggests that it was still on Kelly’s mind and that she may have improved her understanding of it based on advances she was making on the other principles. This may be support for the Knowledge Building Communities principles being a coherent sum of its parts and not just separate entities. Here is what Kelly said about the Rise Above principle (#4).

I think I understand why it (rise above) needs to happen now. Before when the kids were all doing the same, like each group was doing the same question, we had no diversity, so kids were all doing separate things anyway, so why do you need to rise above when everybody’s saying something different? Whereas now there are a lot of kids who are saying the same thing, I can understand why you need to rise above.  

(Kelly – Post interview, March 2006)

Kelly, in her post interview, stated that through her “aha” moment she came to understand that she had been pushing the students unnaturally into categories. At the end of the group meetings her in-class practices had changed to the point that she was allowing the students to put forward their ideas in the database and then she and the students were attempting to make sense of them. It was still the case that she was setting the overall topic (e.g. Medieval Times) but she saw this new teaching strategy as being one that satisfied the Real Ideas, Authentic Problems (#1) principle.
In her post interview Kelly juxtaposed her previous design, the one that she had conveyed during the conjecture meeting, to the one that she had developed through the study group period. Her focus is on the principle (#3) Idea Diversity.

Well, before I was forcing it. I was forcing the kids to have (Knowledge Building) talk, planned talk situations (for them).

I think I was losing a lot of diversity before, the way that it was structured here, was the kids would write their questions down on post-it notes, and then post them on the board, and we’d sort them into categories, and then the kids would choose a category to start with and that would be their view and then we’ve move on from there.

Now, they’re putting their own ideas up there, and it doesn’t even matter, like this whole little conversation going on, it doesn’t even matter that it really doesn’t have anything to do with medieval times. We’re going to talk about that, and as a group we’re going to talk about what to do with those notes. Like I said, if it gets big we’ll probably move it on to another view, but everybody has their own idea in there, and they’re not conforming to a specific question that they had been asked before (by the teacher).

(Kelly – Post interview, March 2006)

In her post interview Kelly related an advance on one principle to an advance on another principle and when asked why she felt she was able to do this she responded:

I think I have a better handle on the whole thing.

(Kelly – Post interview, March 2006)

Analysis of student database work – Kelly

Light & Sound

In comparison to the database activity at Site I, the database activity by students of the teachers at Site III was far less robust. Given that both Chris and Alice had difficulty merging their classes into the on-going Light & Sound inquiry, the study that had been started and advanced mainly by Kelly’s class; this analysis focuses on the profile of Kelly’s class in relationship to their use of the Knowledge Forum database. It must be remembered that only 17 of the 27 students in Kelly’s class consented to participate in this research study. For instance, of the 44 notes written in the “What is light” view, 19 were composed by non-consenting students
and none of the 9 multiple note threads were without a note by a non-consenting student. Therefore the disappointing social network analysis (see Figure 38) may actually be because of an absence of fully one third of the class from the analysis.

Figure 38. Kelly’s class—Light & Sound views: Sociogram of build on interactions between all students with the threshold set to display at least 1 interaction. 18 edges and a density of 13.23%.
Figure 39. Kelly’s class – Distribution of contributions Light & Sound views. Range is 1 note to 21 notes. This graph shows that all of the students in Kelly’s class contributed to the Light & Sound views.

Figure 40. Kelly’s class – Distribution of reading Light & Sound views. Range is 17% to 86%. The graph shows that all of Kelly’s students read notes in the Light & Sound views.

With respect to the reading and writing that Kelly’s class (n = 17) did in the database, the Analytic Toolkit analysis reported that Kelly’s class produced a mean of 7.2 notes (SD = 4.75), read 32.40% (SD = 19.24%) of the notes in the views and 65.40% (SD = 26.70%) of their notes were build on notes. The distributions represented in figures 39 and 40, for the 17 consenting students, indicates that all of these students were active in the database but that the range for contributions (1 note to 21 notes) suggested that some members of the class had a greater presence in the database than other members of the class.

Le Moyen Age (Medieval Times)

The week following the end of the study group meetings Kelly started a blank view with no title and allowed the students to enter notes about Medieval Times in a view that they jointly named “Le Moyen Age”. She wrote in the database the following three-point reflection:
1. The kids have taken control of organizing the view. One of my students has sorted the notes and none of the build ons are overlapping. This has resulted in 2 things – outrage by one of my students because his notes have been moved without his permission, although the rest of the class is okay with having their notes moved – and a real feeling of ownership of the view. They are going in (to the database) and there is more discussion about what is there during their computer time. 2. I am more comfortable with letting students control the view. We did not meet as a whole class this week and will probably meet in the lab every two weeks for reminders and management of the view until it becomes an issue and then it may be more frequent. 3. The kids genuinely seem more interested in what they are studying. I don’t know if it is the topic, or the change in structure to starting, but they seem to be enjoying themselves more in the database.

(Kelly – Database entry, February 24th, 2006)

It should also be noted that the Le Moyen Age view was engaged using French as the language of interaction. This may explain the difference in building on but Kelly maintained that it also could have been the way they began that made the difference in how the students worked in this view. Compared to the Light and Sound views the Le Moyen Age view, where she allowed her students to begin on the computer and, without a guiding question at the top of the view, her class produced marginally different results for the writing (8.4 notes per student, SD = 7.04) and reading of notes (36.00%, SD = 25.63%). Interestingly less of the contributions were build on notes in the Le Moyen Age view with 55.60% (SD = 33.01%) of their contributions being build on notes compared to 65.40% (SD = 26.70%) in the Light & Sound views. This could be support for Kelly’s claim that there was more diversity in the ideas that were initially added to the Le Moyen Age view. Even though these differences are not statistically significant there is qualitative evidence that Kelly felt this new way of starting was a significant improvement over how she had begun in the past. Again, the distributions for contributing and reading (see Figures 41 and 42 respectively) both indicate that all of the members of Kelly’s class were participating in the Knowledge Forum database.
Figure 41. Kelly’s class - Distributions of contributions Le Moyen Age view. Range is 1 note to 25 notes.

Figure 42. Kelly’s class - Distributions of reading Le Moyen Age view. Range is 5% to 79%.
Figure 43. Kelly’s class—Le Moyen Age view: Sociogram of build on interactions between all students with the threshold set to display at least 1 interaction. 33 edges and a density of 24.26%.

The social network analysis based on build on notes for the work done in the Le Moyen Age view suggests a moderate improvement in the density of the connections between the students in the class (24.26% compared to 13.23% for the Light and Sound views - see Figure 43).

Student 8 was selected as the mid-range student to examine the profile of activity in the database. During the period from January to March this student produced six notes in the database. There is regular pattern of contribution that appears to map onto the availability of the computers in the classroom.

As noted earlier, comparisons between the teachers and the classes was problematic given the low number of student participants and the variety of curriculum topics that were engaged in by the classes. However, comparisons between the views developed by the same teacher and their class can be informative.
**Writing Measure for Student 8 (Kelly) P.**
*(Jan 17, 2006 to Mar 29, 2006)*

**Figure 44**: Kelly’s class—writing profile of mid-range student (student 8) from January to March. The range for words produced is 0 words to approximately 185 words and the diversity of the words is approximately 120 words.

To explore other differences between the work done by Kelly’s participating students in the Light & Sound views and the Le Moyen Age view I looked at other measures of the Analytic Toolkit. The one area that presents as being different is the distribution of the number of problem statements that were entered by the students (see Figure 45). In this figure it can be seen that students who didn’t include a problem statement in their Light & Sound notes included this piece of information in their Le Moyen Age notes, while in only two cases did students state fewer problems. One possible explanation is that the need to state the problem that a note was intended to address was heightened when the title of the view was no longer directing the problem that was being worked on in the view.
Figure 45. Bar graph representing the distribution of the problem statements filled in by students in the Light & Sound views and the Le Moyen Age view. Range is 1 problem to 9 problem statements in the notes written in the Le Moyen Age view and Light & Sound views.

**Student perspectives – Kelly**

As was the case for Sites I and II a subset of students were identified by Kelly as being either low, moderate or highly engaged in the Knowledge Building done by the class. From these students I interviewed four students, one low, two moderate and one high. All of the students from Kelly’s class who were interviewed were able to identify the main topics of study completed by their class.

*Student responses to the following questions are reported below.*

**What is important to know about the Knowledge Building Communities model?**

“Basically sharing ideas and hearing (them) in another person’s point of view” (student 17)

“It’s about expressing what you are thinking with other students in your class and knowing what they are thinking.” (student 13)

“First having your idea and then having the ideas of others. Sharing (ideas) to other students” (student 6)
“Knowing what other people know about this similar topic and we can learn new stuff” (student 4)

This set of responses about the Knowledge Building Communities model suggest that Kelly’s students are lagging behind her in terms of the sophistication of their understanding of the model. Where Kelly has moved to view the release of agency and the improvability of ideas as connected and as important elements in the implementation of the Knowledge Building Communities model her students view the model more in terms of the sharing and communication of ideas between students.

Who decides how Knowledge Building happens?

“We do it together” (student 6)

“The students decide” (student 13)

“Maybe it is the teacher who decides” (student 17)

“Our teacher told us we could do our own theories” (student 4)

With respect to the release of agency the question about who decides how the Knowledge Building Community happens in the classroom was particularly revealing. The range of responses from the sample of students interviewed reveals a group that has a range of views on this issue. This could be because the classroom is variable in terms of the release of agency however it is possible that in this case it is an indication of a class that is in transition from being teacher-directed to one that is more student-directed.

What materials do you have in the classroom?

“Internet, dictionary and my own knowledge” (student 4)

“Books” (student 17)

“Chart with (KBC) steps” (student 13)
“We have a big sheet that tells you what to do with your laptop. If you want to prove something you can go on the Internet. Or you could go in the encyclopedia” (student 6)

When asked about the materials that had been available in the classroom the sample students reported a range of materials but two focused in on the chart that Kelly had developed to communicate the steps that a students could go through as they engaged the Knowledge Forum database during class. Reading other notes and considering their theories were first on this list that also included finding resources to help address their questions.

_How do you know you are making progress?_

“Writing is happening” (student 6)

“More interaction with more and more participation. Putting our hand up if we know the answers” (student 4)

“More and more people are connecting to us because for some of them no one connected to them” (student 13)

“By making better notes on what you already know and other people build on” (student 17)

These are the statements from the sample students about how they know they are making progress. The responses to this question by the sample of students from Kelly’s class ranged from no idea at all (student #10) to increased levels of participation in terms of writing and building on. Interaction through writing was the common thread that runs through their responses. None of the responses described the improvement of ideas as an indication of progress.

_How should Knowledge Building end (e.g. Light & Sound)?_

“Write everything we know about (light & sound) and compare from the start to what we learned and then we’d compare it with other people” (student 4)

“No response” (student 17)

“All of the stuff I built on I wrote down” (student 6)
“Our teacher showed us how we can make a few last changes because a few people just wrote you’re right and she showed us how to delete our notes” (student 13)

The sample group’s report of how the Light & Sound study ended suggests that it didn’t have a clear end-point. For the students who did see an end to the study, for them it ended by referring back to the questions and ideas that had been put forward at the beginning of the unit.

*How was the start of Medieval Times different?*

For Kelly’s class a supplementary question was asked in relationship to the Medieval Times (Le Moyen Age) study and how the start of that study was different than the Light & Sound study. Kelly’s altered strategy for starting, by creating a blank view and inviting all students to write in their questions and ideas, was acknowledged by several of her students in their post interviews. Student #13 made the following comment:

I saw that (Kelly) didn’t make groups like in light & sound, because in light & sound we got to choose what we would work on but for Medieval Times (Le Moyen Age) everything goes in one (view) instead.

(To start Light & Sound we made) sticky notes, then put each sticky note under titles. (we) got to say two choices. (Kelly) tried to give us our first choice but if there were too many people she would give us our second choice.

(In the Medieval Times study Kelly) didn’t (make) us choose, she is just let us put in (the database) whatever notes, but it has to be based on Medieval Times.

(Site III student #13 interview, March 2006)

When asked what she thought of this approach student #13 responded that she liked it as it made it easier to navigate to certain notes since she didn’t have to go into different folders (views) to find the notes. She did express concern that because this was a new way of working it would take a bit of getting used to but she was supportive of this change. Most interestingly, this student reported that she was able to explore a question that she only learned existed from a conversation in class.
I want to know more about the Black Death because when someone in my class mentioned it I didn’t know what it was about but when I read more notes (in the database) I am learning more about it.

(Site III - Student 13 interview, March 2006)

Site III – Summary

All three of the teachers who participated in the Site III study group reported that they perceived improvements to aspects of their understanding of the Knowledge Building Communities model. Kelly reported changes that were also supported by analysis of the Knowledge Forum database work and student interview data. The major insight being that she felt she had in the past been doing the Knowledge Building Communities model in a manner that was not in line with the Knowledge Building Communities model and that the study group meetings had directly contributed to her perceived changes in understanding and in her classroom practices. Alice also reported feeling that she had made important advances in terms of her understanding of the Knowledge Building Communities model and in a more limited way her associated classroom practices. In both of these embedded cases Kelly and Alice had framed their classroom experimentation in terms of one of the Knowledge Building Communities principles. Chris did not report similar changes in her perceived understanding of the Knowledge Building Communities model. Upon examination the finding suggest that Chris had framed her classroom work not as a principle-based inquiry but instead focused on it as a software-based intervention. This framing of the problem space appears to be an important consideration as it relates to the progress of the group discourse and in turn to the type of experiments that the teachers were willing to try out in their classroom. For instance, the experiment about a different way of starting a new study, by starting a new blank view, led Kelly to recognize what the way she had been implementing the Knowledge Building Communities model was not in keeping with the underlying principles of the model. The Site III case study supports the proposition that:
discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them, through the literal replication logic. The next section examines the type of discourse that occurred in the study group meetings by focusing in on study group meeting episodes for each of the study groups with a focus on those episodes that were framed by Knowledge Building Communities principles or represented unique opportunities to examine the discourse that may have contributed to these findings.

Analysis of study group meeting discourse

In this section I focus on selected episodes from study group meetings using Chronologically-ordered Discourse plots to combine the questions asked (i.e. information seeking or generative design questions— see Eris, 2003), aspects of the underlying Knowledge Building Communities principles that are explicitly discussed, the type of stories told, and whether a commitment is made by an individual to do something differently in their classroom. The stories category was added after reading the meeting transcripts in more detail and noticing that some stories were about the context, while others were about projections about what could happen in the classroom if something was done differently. Although related to generative design questions these stories went beyond asking “what if” to outlining what could be done. A final type of story, usually but not always, told by me as the university researcher/participant-observer, were more general in nature as they told of how others (most times without being specific about who) had approached a similar Knowledge Building problem in their own context somewhere else in the world. This last category then had three story types: global, projective and contextual. Reliability of the coding was a concern as my participation in the meetings and the coding raised bias issues. To mitigate against this issue the following episodes were coded by me
and a second rater. Cohen’s Kappa values were computed in NVivo. All of the episodes scored in the high moderate (0.41 – 0.60) to substantial range (0.61 - 0.80) for the Kappa value on the initial coding. Then the raters discussed their ratings and adjustments were made to establish complete agreement on the codes.

Site I

The second meeting of the study group at Site I was analyzed to develop a provisional profile for how an established study group working on principle-based change in their understanding and practices might typically function. The distribution of who spoke in this meeting (see Figure 46) indicates that Rick and I spoke almost equally, while Zara, the least experienced in terms of the Knowledge Building Communities model, listened for a major portion of this meeting.

Figure 46. Site I meeting #2: Distribution of the conversation during the meeting based on words spoken. Range is 22% to 40%
During the second meeting the problem that the Site II study group focused on was how to bring to the forefront the current state of knowledge of the students. This discussion revolved around the use of the rise above note and also moved into consideration of embedding of assessment, and the value that these notes served in moving Knowledge Building along. In this meeting the study group began to explore how views and notes could be used to fulfill the rise above function and it was in this meeting that the idea of the “coloured patch” described in the case study was developed, as well as the idea of using a separate view to hold rise above notes about what students’ thought they knew. The main principles that were explicitly discussed in this meeting included Rise Above (#4) and Constructive Uses of Authoritative Sources (#10) but all of the Knowledge Building Communities principles were discussed except for Symmetric Knowledge Advancement (#8) (see Figure 5). With respect to the Community Knowledge, Collective Responsibility principle, it was reasoned that because it was important to enable students to better see what they collectively understood and what they needed to know, that this promoted a requisite responsibility for all participants to help advance their understanding. This idea was not presented by the university researcher but offered first by Rick and then supported by Zara.

As indicated in the methods section, a Chronologically-ordered Discourse plot is used to display the discourse of selected study group meetings. The following Chronologically-ordered Discourse plot (see Figures 47 and 48) presents the discourse pattern for an episode from the Site I study group meeting #2. This analysis represented a preliminary effort by the university researcher/participant-observer to provide details about the functioning of this type of group. In meeting #2 the Site I study group focused on how they were going about incorporating the Rise
Figure 47. Site I meeting #2 - Chronologically-ordered Discourse plot for the second meeting of the study group at Site I
Above principle (#4) into their classroom design. Rick presented a story about what had been happening in his classroom (see turn 2). This was prompted and surrounded by several questions asked by me, each referencing a Knowledge Building Communities principle to get information about how the focus on the Rise Above principle (#4) was proceeding and how it might relate to another principle that had been identified by the group, Constructive Uses of Authoritative Sources (#10). Rick answers back with several stories about what had been

Figure 48. Site I meeting #2 - Chronologically-ordered Discourse plot for the second meeting of the Site I study group continued on from figure 47.
happening in his classroom. I also offered a global story about how another group in another location had gone about addressing the Rise Above principle in their Knowledge Forum database (see turn 11). In her post interview Zara indicated that she had learned from this one story, how some other groups had used the coloured patch idea to situate their rise above ideas.

The group then engages in a discussion about possible ways they could implement a rise above patch in the classroom (see turns 18 to 24). Several of these turns (see turns 22 and 26) were also associated with questions that positioned the statements as projections about possibilities for new ways of working in the classroom and in the Knowledge Forum database. Out of this period of problem finding (Scribner et al, 2006) Rick made commitments about what he was going to do in his classroom as a result of the discussion (see turn 24 and 36). Later in the meeting Zara also committed to continuing to explore how to get her students to use the coloured patch to communicate about their knowledge advances. The overall contour of this episode is that it is framed by the Knowledge Building Communities principles, and is interaction focused on exploring how the Knowledge Building Communities model might work in their context and on how they can take action to try their new designs out in practice.

Site II

This analysis focuses on the meetings that occurred from January to June when the study group consisted of Wendy, Don and myself as the university researcher. During this period of time the group held an initial conjecture meeting (that was also our first working meeting - January), a final retrospective meeting (June) and eleven other meetings in between. Of these meetings five were not transcribed either because of poor quality audio (one meeting) or the meeting had not been recorded (four meetings). Of the meetings that were not recorded three were because they involved only Wendy and Don and they had not
turned on the recorder, while the other meeting was not recorded due to technical difficulties. Of the remaining meetings that were recorded and transcribed one involved only Wendy and Don, one involved only Don and myself and the remaining four meetings involved all three members of the study group. Given that these four meetings spanned the entire time from January to June and included meeting transcripts from March and May this set of documents was examined for instances when the discourse centered around key concerns that had been raised by the teachers and/or a Knowledge Building Communities principle had been explicitly raised and discussed.

![Study group meetings (sample with all members present)](chart)

**Figure 49.** Site II meeting participation—This figure displays the changes in study group participation over four sample meetings by participant; range 23.93% to 42.97%

Due to the span of time in between the first meeting (January 16th) and the next recorded whole group meeting (March 13th) I also found it useful to analyze the manner in which the group made use of the Knowledge Forum database to communicate during January and February. Chronologically-ordered Discourse plots have been produced for the database
notes produced during this period of time, for a middle portion of the teacher-to-teacher meeting and for the fifth meeting that was held in March. This section closes with an excerpt from the final meeting held on June 3rd which was combined with Wendy teaching to the whole group (both classes).

Wendy, in the retrospective meeting stated that she felt she would have benefited more if I had been more guiding of their implementation.

I wish you told us more stuff (to the university researcher)...I know that’s part of your research, but it would be good, it would have been better, if you gave us more. You demonstrated...you did demonstrate things but demonstrating more things and guided us along the process. Like just for us, I would have felt...because you’re the expert, right.

(Site II - Retrospective study group meeting, June 23rd, 2005)

The demonstration Wendy referred to was an instance when she asked me to become involved in a conversation that her class was having about the Skin Colour view. In the following episode from the retrospective meeting Wendy refers to the different way I spoke to her students. It appears that my modeling of how I speak to students may have actually limited her ability to find her own Knowledge Building “voice” with her students.

Just listening to your dialogue and what you say, and that would be the difference if we had the time and the opportunity...but the way you speak to them is different from the way I speak to them. I mean, we have obviously a different manner with the children. But there are certain questions you will ask them that maybe I wouldn’t even really think about—(but) your talk was different—

(Site II – Retrospective study group meeting, June 23rd, 2005)

In the retrospective meeting there was an extended conversation about the goal and functioning of the study group after which Wendy made the statement that she would have preferred an approach that was more directed. I asked Don and Wendy whether that would have changed the implementation into something that may not have been relevant to their context.

UR: I guess the question is, how much of an inventor did you feel you were? Or did you want more to be an implementer? And if you wanted to be an implementer,
would you have been okay with me giving things that didn’t work, like—

DON: And we felt like we were discovering things and learning things, like we felt—

WENDY: We were Knowledge Building—

DON: Whereas if we were just sitting here listening to (you) saying, ‘now do this, and now do this and now do that’, we really wouldn’t have been learning anything—

WENDY: But—

DON: Except through the experience with the kids.

WENDY: But in trying to use some kind of model, these principles, and not...it’s like having a student-teacher and giving them math but never demonstrating a math lesson, or demonstrating a series of math lessons—

UR: So you feel there would have been...you would have been able to keep your head about you if you had the principle and (an) example of how the principle was used somewhere else...available to you? (Wendy nods)

(Site II - Retrospective study group meeting, June 23rd, 2005)

There appears to be a tension between wanting to be guided through the implementation of the Knowledge Building Communities model and realizing that it needs to be developed to fit into the local context. The concerns about the students and the curriculum expressed by Wendy and Don suggest that there needs to be a level of customization to make the Knowledge Building Communities model work well in their setting.

DON: And you (UR) know where you’re going, you can see your method—

UR: But I don’t know if I can get there or not. Like I have to be honest, as I’m asking that question—

WENDY: Because you don’t know the kids as much—

UR: I’m basically running an experiment because I think I know how that question worked in another site but I don’t know if it’s going to work here or if it’s the right question.

(Site II - Retrospective study group meeting, June 23rd, 2005)
The expressed need for input from the university researcher, or someone who knows about the Knowledge Building Communities model, highlights another issue that was uncovered
during the Site II case study. The easy ability for Don and Wendy to converse about their implementation in the absence of the university researcher, the “critical friend” (Curry, 2008), appears to have worked against their implementation being framed by the Knowledge Building Communities principles as both Wendy and Don felt they would have been further ahead if they had received more direct instructions on how to proceed.

Although tape recorders were given to both Wendy and Don they didn’t always turn them on during their morning planning meetings. One of the planning meetings that was recorded offers insight into the teacher-to-teacher discourse during one particular meeting held on May 20th. A Chronologically-ordered Discourse plot was created (see Figure 50) to examine the pattern of interaction during a portion of this meeting. The episode of the transcript that is focused on is when the teachers were discussing the students and how Wendy and Don were going to engage them over the coming few weeks.

In the plot there is clearly an absence of references to the theory in this episode of the transcript and it is actually the case that there were no references to the Knowledge Building Communities principles throughout the entire meeting transcript. It is also the case that the questions that they were asking didn’t lead to any discussion about how things might be done differently (e.g. generative design questions or projective stories). This section of the conversation (see turns 49-63) was entirely about concerns related to whether the students in these two classes could think well enough to engage in further Knowledge Building. The other missing component in the Chronologically-ordered Discourse plot is an expressed commitment by either teacher to what they might do next in the classroom, although the conversation had began with a discussion about focusing the students on their Knowledge Building topic for a whole week as the term was coming to a close. The meeting concludes with an agreement that
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*Figure 51.* Site II meeting #5 - Chronologically-ordered Discourse plot for episode from Site II study group meeting #5.
Don and Wendy needed more time to plan such a focused period of Knowledge Building.

The contextual concerns that were raised by Don and Wendy during their teacher-only meeting were also present much earlier in the fifth meeting that was held on March 16th. However during that meeting the teachers had a more positive outlook with both teachers making projections about what they might do when they returned to school after the spring break. The Chronologically-ordered Discourse plot in Figure 51 tracks one episode during the fifth meeting, during which time the group was discussing the principles of Real Ideas, Authentic Problems (#1) and Epistemic Agency (#5) and how they could promote these principles in the racism and discrimination study once they returned to school after the spring break. Although there were no specific commissions made by the teachers in terms of what they would do when they returned both teachers projected about what they might do in with the students to continue with this study in a Knowledge Building manner.

*Site II – Study group discourse in the Knowledge Forum database*

An analysis of database contributions during the fall suggests that Tanya was not reading or writing on Knowledge Forum in either her journaling view or the study group view. Don reported feeling very alone in the Knowledge Forum database during the fall. In the winter, after Tanya departed and Wendy joined the study group, we decided to stop using the more personal journaling views and focus our attention on the common view to promote group discussion between the study group participants. Of the three sites, the Site II study group was most active, particularly during the initial period following the first meeting held in January. During this period there was an active discussion between the three members of the Site II study group. The following analysis focuses on these database notes.
Figure 52. Wendy’s writing profile: The line graph shows the writing profile of Wendy the most active point being at the beginning of the study; Words in notes range from 150 to 2100.

Figure 53. Site II – Knowledge Forum database screenshot discussion between study group members (January 25 to February 28, 2005)

Figure 52 represents Wendy’s writing activity in the Knowledge Forum database over the winter and spring terms. It is clear from the graph that Wendy was most active during the initial period from late January to early February. Figure 53 is a screen capture of a portion of the study
group’s view in the database and plainly indicates that it was Wendy who initiated communication. When the notes were coded the following pattern was revealed across these database entries (see Figure 54).

![Figure 54](image)

Figure 54. Site II study group’s Knowledge Forum notes - Chronologically-ordered Discourse plot of Knowledge Forum database discussion January 25th to February 28th 2005.

The resulting pattern has similarities to the one identified in the face-to-face meeting discourse of Site I study group and in the second meeting of the Site II study group. The only missing components in the Chronologically-ordered Discourse plot for the discourse as
represented in the database entries was a commission about what was going to be done in the classroom. This is not unexpected as the asynchronous nature of this form of communication made it difficult to coordinate the discussion with the activities of the classroom although they were clearly related in terms of the goals of the discussion to gain specific insights about how to position oneself within the Knowledge Building Communities model and how to encourage the students to build knowledge together. Three Knowledge Building Communities principles (#1, #4 & #10) framed this discussion with Don providing the references for Rise Above #4 and Constructive Uses of Authoritative Sources (#10) in his third note (see turn 11).

The promise of face-to-face meetings over-shadows the use of the on-line system for discourse about the implementation, which in the case of the Site II teachers was unfortunate as they had demonstrated a promising pattern of interaction in the early stages of the study group through their use of the Knowledge Forum database to communicate. Despite initially using the database to discuss both the Knowledge Building Communities model and contextual issues the group dropped back into preferring to use face-to-face meetings as their primary means of communicating and working together. At the end of the year Don reported that he didn’t use the on-line discussion space as much as he had expected he would because he knew the face-to-face was going to be available.

Face to face, I’d have to say was critical in some respects. In a way since we know there’s face to face we tend to not use the database but if there was no face to face but probably the database is our only hope so we have to do that. But why am I going to sit here and type when I can go and talk to her? And I’m probably going to wait for you because you’re going to come on Friday so I’m not going to type it in there on Wednesday.

(Don – Post Interview, June 2005)

DON: We kind of said, ‘oh we’ve got to put this in here (the KF database),’ because you needed the data. But often, we had done the stuff face-to-face. WENDY: And technology is supposed to make it easier and better—
DON: We didn’t need it—

WENDY: Why do we need to type it all out if you’re looking at each other in the face?

DON: That’s right, it was more convenient (to talk face-to-face).

(Site II - Retrospective study group meeting, June 23rd, 2005)

As demonstrated above Don and Wendy’s perspective on the use of the database for the study group runs counter to the evidence about the nature of the discourse in the Knowledge Forum database when the group first got started in January. Between the first and second face-to-face meetings the Knowledge Forum database was used to converse about several key issues however it did not yield commitments to take action. The interactions also highlight the focus that Wendy and Don had on their contextual concerns related to their students and the curriculum.

Site III

This section examines the Site III study group meetings as support for teachers’ sense making about the Knowledge Building Communities model. This section also presents the idea that teacher problem solving and experimentation in the classroom, the trying out of the new approach in practice, interacted with sense making during the study group meetings. Specifically, the stating of commitments to take action in the classroom is something that was seen in the plot for the Site I study group but was absent from the plots for the Site II study group. This section begins with a review of the perspectives of the Site III teachers regarding the importance of the study group meetings and then there is a discussion about the role of the university researcher at this site.

All of the Site III teachers supported the study group idea and thought it would provide support for one another. Alice described why the study group would work well for her.

I think this is great because it’s a small group meeting over a period of time as opposed to other types of professional development where they’re isolated experiences, so hopefully because you have this repeated exposure with each other, and you’re all working on the
same problem, your development, you can actually see a progression going as opposed to just isolated workshops or isolated opportunities to take courses on your own. You’re implementing things in the school, so you’re actually seeing if it works in the school and making changes as a group so it’s a little but more hands on, and practical in the sense that it’s affecting what you’re teaching and how you’re teaching, day to day.

(Alice - Pre-interview, January 2006)

Alice liked that the study group meetings were going to be collaborative so she would be able to learn about the software and what others were doing in their classrooms.

The hands on, and I think you’re, it’s also the reporting back. So from my experience so far, workshops have been, you go out, you get the knowledge, and the onus is on you to either apply it or not. But here there’s an accountability factor as well. You’re expected to report to a small group at the school, how’s it working, how’s it not working, what would you need to change, so there is that accountability and reporting that’s involved that isn’t involved in other types of professional development.

(Alice - Pre-interview, January 2006)

Kelly reported in her post interview that it was the discussion about the principles during the fourth study group meeting that had caused her to call into question how the Knowledge Building Communities model was being worked out in practice in her classroom.

UR: So when you started to read about the principles or to have us talk about the principles that opened you up (to) having knowledge about a different way of doing things?

KELLY: Um, not knowledge about a different way of doing things. It just, it sparked off ideas in my head about a way that I could do something differently, and that’s the main thing.

(Kelly - Post Interview, March 2006)

In her pre-interview Kelly had suggested that this type of professional development would be different than other types she had been involved in previously.

You have a constructive part in it. You help lead it. You help design what you want to do and how you want to follow things through. And it also gives you a chance to present the problems that you yourself are having, and help solve the problems other people are having, as opposed to other professional development where they sort of stand and talk to you.

(Kelly - Pre-interview, January 2006)
Also Kelly had indicated that she felt the meetings would be useful because they were going to focus on the Knowledge Building Communities principles.

I would see us pinning stuff down so that we can move on. I sort of feel like we’re stagnating a little bit here, like we’ve…got a really great idea and we’ve taken it so far and then we’ve stopped. I would like to see us push through that and get to something (deeper).

Because I think right now we’re sort of spiraling. We keep coming back to the same ones (principles) that we’re doing and we’re doing okay.  

(Kelly - Pre-interview, January 2006)

In the retrospective meeting the three teachers discussed the value of the meetings and specifically how they had influenced what had occurred in those meetings. There was particular attention paid to study group meeting #4. Alice reported that she felt she had had no role in those meetings but alters that perception when she realizes that she had influenced what had taken place in meeting #4.

ALICE: (I)Initially, I would have said, well, I don’t feel like I had input in that way. I felt more like I was the sponge, absorbing the ideas from two rooms and okay, I’ll go and try it, but then hearing what you just said, that it was from a problem I had brought to the meeting that you had that (aha) moment, that you know, the whole crazy idea.

KELLY: Yeah.

ALICE: So I did have a role in that, even though a second ago I didn’t think I did. So even by just bringing my problems to the table and saying, well, here’s what I’m facing, give me some feedback, give me some guidance, it led to something, so in a circular kind of way it had to have been the three of us in this room talking about it, otherwise that moment and that moment wouldn’t (have happened), if I was just isolated in my room, calling you (UR), I can’t get on my computer, what do I do?

KELLY: And it was our discussion about the problems that we were having with the kids that resulted in us taking the names off (the database notes).

CHRIS: Yeah. I found the meetings very helpful, in that sense.  

(Site III Retrospective meeting February 23rd, 2006)
This actually represents a change for Chris as at the beginning of the study she had a less ambitious goal for the meetings. At the beginning she simply saw the meetings as a way to communicate about what was happening in the other classrooms.

(Chris - Pre-interview, January 2006)

The follow exchange is centered around helping the teachers come to terms with how often they should be entering the database to read and respond to student work. This fits well with the idea that these types of meetings help teachers to know what is culturally permissible in the context (Barnett & Hodson, 2001). From this interchange it is clear that the two new teachers had very low function when it came to the software. However, what is most salient in this exchange is that they are searching for a norm, one that will ensure that Knowledge Building can happen, but also allows them time for other things.

KELLY: Yes, that’s right. And it is funny because they’ll start to use idiomatic expressions, which can get a little out of hand, but that’s okay, that’s part of learning. You just keep going in, you keep checking and kids immediately who don’t, they get a little sticky, I have a conversation with them, and their note’s deleted.

ALICE: Yeah, I had a question about that with (UR) earlier, in terms of the checking, like keeping on top of who’s doing what and who’s responding to who and how it’s progressing, how often do you?

KELLY: I would like to go in once a week. I haven’t been in as often as I would’ve liked. I haven’t been on in several weeks.

ALICE: Just not a daily thing.

KELLY: It’s impossible to do on a daily thing. I would pick a day sort of in the middle of the week, like a Wednesday, that you’re going to go in. Just schedule it in. Every Wednesday I’m going in after school and I’m going to take a look, and then that way if there’s something that you need to address right away, then you have Thursday and Friday to do it.

ALICE: Okay.
CHRIS: Okay.

KELLY: So what I do, usually the first time when you go in it takes a long time. You’ll be there for a couple of hours, but I always thought it was better just to get it over with, and get in and read. And then if you go in weekly, it’s a lot less, because they’re only responding if they have something to say and if they don’t it’s really quick to pick that up, then that’s it. End of conversation. You could do it in forty-five minutes or an hour.

ALICE: But there’s a way of being able to know where you’ve left off and where it’s gone to since you’ve last seen it?

KELLY: Well, yeah, because the notes change colour once you’ve read them.

CHRIS: Hey, I didn’t know that! (laughter)

(Site III Conjecture meeting, January 11th, 2006)

Kelly noted in her post interview that the meetings had also served as a time to reflect on what she was thinking about the theory and her practices associated with its implementation.

And then it sort of mushed around in there for a while and came up the way it is.

(Kelly - Post Interview, March 2006)

The value of the meetings was reinforced in the following interchange with Kelly.

KELLY: I think just having gone through this, because I assume what all these meetings have been about, a lot of it, it’s just one of those things that just sort of started to click in.

UR: What do you mean by that?

KELLY: Well, rethinking of the way we’re thinking.

UR: So you see the meetings themselves as...

Kelly: Everybody’s talking, I’m listening, but I’m trying to take things from what other people are doing, spreading them around.

(Kelly - Post Interview, March 2006)

Asked when she did this listening and thinking she replied,

During the meetings! When I was supposed to be paying attention!

(Kelly - Post Interview, March 2006)
Two references from Alice during her post interview speak to the other aspect of the importance of the study group meetings to her. She noted that the meetings created an expectation that something was going to be done by each person that could be reported on.

But also, to be quite honest, (the study group meetings) made me accountable, because I knew that each week I was going to have to come to these meetings—Not have to come, because that sounds really bad, like I didn’t want to be there—but that I was going to be there, so I had to have something to say, and that means that you’re doing the knowledge forum in your classroom and you’re really pushing each other to use it in whatever way it works for you, but at the same time just like the kids, you’re working towards something together, so you’re more invested in the process, as opposed to it being something that, you know, I can either use or not use, but there’s no accountability factor in it. So for me that was a big part of it as well, really knowing that, you know, what am I thinking about this week? What aspect of my students am I trying to focus and help them get along? And then just getting feedback on things like students who have stage one English as a Second Language issues, wrapping my brain around that, and how I’m going to make this function in a school where, you know, we do have some support, but timing is an issue, and things like that. So overall, I did find them very helpful.

(Alice – Post Interview, March 2006)

Alice also felt that the personal nature of the problems that were taken up by her and the study group were particularly important to her gains. That and her ability to bring it to the group for discussion.

Because it’s a problem that came up in practice that as a group we were trying to design, or generate, some sort of workable solution. So if I was isolated in the classroom on my own without a team to go to, I don’t see it being as doable for me because I don’t have the experience working with knowledge forum, but as part of this team, collectively, we have, each of us, our own individual strengths, and we’re working on this problem. Which may not be Chris or Kelly’s problem right now, but it may come up down the road, and so as a team, we’ve now solved something that benefits the school. As a whole…

(Alice – Post Interview, March 2006)

Role of the university researcher – Site III

The Site III teachers’ perceptions about the study group meetings and engagement with me (the university researcher) changed from before the meetings to after the meetings. Prior to the meetings Kelly reported that she found more value in talking to her colleagues about Knowledge Building:
I (find) more value in, no offense intended, in just talking to Debbie about very specific things and having like a mini (Knowledge Building Talk), her and I, or her and I and one of the other teachers. We found that upstairs we’ve started to really talk about this stuff in the hallway, which is really good. And I found that I get more out of that than (meetings). It just seems a little too structured.  

(Kelly - Pre-interview, January 2006)

Then later in her pre-interview Kelly stated the following that indicated that she felt there would be value in having a university researcher as part of the meetings.

I think we need somebody to keep us all knowing what we’re supposed to be doing. If we get too involved in the research itself, or into designing things ourselves, we tend to go in seven hundred different directions. We need…there needs to be one person who is responsible for sort of going, okay, that’s a good idea, now let’s bring it in to what we can do here.  

(Kelly - Pre-interview, January 2006)

Also in her pre-interview Kelly answered the perceived value of the university researcher question in the following way:

I don’t know that we would necessarily need you to come every week, I don’t know that we’d need you to come even twice a month. But I think it’s still good to have the touch-base there, so that if we’re getting off on the wrong, like if we really don’t understand one of the principles and we thought we did, we need somebody to bounce that off of, to make sure that we’re doing it.  

(Kelly Pre-interview, January 2006)

Kelly felt that she and her colleagues would be capable of working through the technical issues but that they were also capable of going off track and that having contact with someone who could look over their shoulder would be helpful. This fits with Judith Warren Little’s findings about the conflict she found in teacher communities as places where teachers are required to deal with, “the force of tradition and the lure of innovation – simultaneously” (Little, 2003, p. 939). In this case the presence of the university researcher would seem to have set up a new dynamic within the teacher community that helped to move the discussion toward the innovation of the Knowledge Building Communities model.
The other members of the Site III study group also felt that there would be value in having the university researcher in the meetings. However this valuing differed in significant ways. Alice commented on the value of having a university researcher in the weekly meetings by saying:

Not in a negative way. I just think it will, it’ll probably be a more informed conversation, because you have more background with the principles and the system, and what’s involved with it.

(Alice - Pre-interview, January 2006)

Chris also supported the inclusion of the university researcher in the meetings but moved her support more in favor of the university researcher bringing knowledge about how to use the software.

By the end of the series of study group meetings the teachers’ attitudes about the inclusion of a university researcher, and in turn, the Knowledge Building Communities principles, had changed significantly. In particular Kelly and Alice noted that the inclusion of the Knowledge Building Communities principles had potentially changed the nature of the discourse in the study group meetings. Kelly stated in the retrospective meeting that:

I think it (the Knowledge Building Communities principles) may have contributed a scaffold for the conversation, so every time that we’d say something about it or that would come close to that principle, you would say, that’s Epistemic Agency (#5), then it sort of skewed the next bit of conversation.

(Kelly - Site III Retrospective meeting, February 23rd, 2006)

Alice also supported this perspective on the role the Knowledge Building Communities principles had played in the study group meetings:

I don’t think the type of conversations we’ve had would have been the conversations we had if you weren’t here. I don’t know if we would have gotten onto this… it may have been more practically based… as opposed to theoretically based, if it was just a group of teachers.

(Alice - Site III Retrospective meeting, February 23rd, 2006)
Site III - Study group meeting analysis

The four core meetings that were held with the Site III study group are presented both from the perspective of how many of the Knowledge Building Communities principles were involved explicitly in the discourse and also how the pattern of interaction in the selected episodes from the second and fourth meetings relate to the pattern identified in the second study group meeting at Site I. The key focus being on the Knowledge Building Communities principles, stories told, questions asked and commitments made by the teachers. These interactions are presented in Chronologically-ordered Discourse plots in the following section.

As far as participation is concerned there was a remarkable leveling out of participation by the Site III participants over the course of the four core meetings (see Figure 55). Meeting 1 was dominated by conversation about technology and was led by me the university researcher.

![Figure 55. Site III meeting participation](image)

*Figure 55. Site III meeting participation — This figure displays the changes in study group participation over the four meetings by participant; range 3.39% to 86.86%*
Site III - Study group meeting #2

My suggestion that the teachers give their classes more agency over their inquiry, both in terms of the ideas that were being allowed to work on, and how they were being allowed to work, was challenged by the teachers consistently throughout the episode plotted in Figure 56. Kelly’s final two statements in this episode were:

KELLY: The second challenge is because they are learning the third language for the first time this year so to explain to them everything that they’re doing, in those cases, would just overwhelm them and I have several who are high-strung and it would just…(turn 256)

KELLY: This isn’t the right thing to try right now. (turn 258) (Kelly - Site III study group meeting #2, January 25th, 2006)

It is clear from these statements that at this point in the second study group meeting (see turn 258) Kelly viewed the release of agency as an issue that she didn’t feel was appropriate for her students. In this episode (see Figure 56) all of the teacher turns relate to issues with the local context that they feel precluded them from being able to make their Knowledge Building Community implementation more open to student input and management. Again, discussion in this episode centered on my repeated attempts to suggest the group release more agency to the students (see turns 247 and 253). The episode began with a discussion about computer availability and the teachers’ feelings that if they had better access to the computers, when ideas come up, they would be able to make the Knowledge Building Communities model work better in their classrooms (see turns 239). I then moved to asking if there were other forms of technology such as pencil and paper that they could use when the computers aren’t available but the students wanted to get their ideas down. Both Kelly (turn 243) and Chris (turn 244) state that they have used sticky notes. The conversation then carries on with me trying to clarify how the class could actually operate in terms of groups and purpose. My question (see turn 249) is about
allowing the Knowledge Building Communities to pervade more of the classroom activity and therefore not be so reliant on the computers. I also caution against creating a rotation/activity center solution as this works against the idea that the Knowledge Building Communities inquiry is pervasive. However, Kelly defended her design. She says:

It doesn’t mean the science people can’t go and discuss things with (the) Knowledge Forum people just because those are the groups that they’re in. but it also means the science people also have a task that they’re supposed to be completing. Now those aren’t children-generated tasks, those are only generated tasks because I have expectations that I have to finish covering. (turn 250)

(Kelly Site III study group meeting #2 January 25th, 2006)

Even despite raising these significant contextual concerns about the students’ abilities to cope with being given more responsibility for the work going on in the database, the Site III teachers managed to work toward committing to making certain changes in their classroom design in the coming week. This can be seen in the Chronologically-ordered Discourse plot for the next portion of the Site III study group meeting #2 (see Figure 57 – turns 260 to 283). This episode followed directly after the one presented in Figure 56 and focused on the principle of Improvable Ideas (#2). Notably, this episode ends with each teacher committing to take certain actions in their classroom over the coming week and report back to the group at the following meeting.
Figure 56. Site III meeting #2 - Chronologically-ordered Discourse plot for Site III study group meeting #2.
Figure 57. Site III meeting #2 - Chronologically-ordered Discourse plot study group meeting #2 turns 260 to 283.
Site III - Study group meeting #4

The Chronologically-ordered Discourse plot for the episode that occurred during Site III study group meeting #4 covers turns 117 to 152 of that meeting (see Figures 58 & 59). It was during this section of the meeting that Kelly experienced her self-described “aha moment”. This episode is also presented as a moment of significant problem solving for the Site III study group.

This episode was referenced by both Alice and Kelly in their post interviews as a key moment in their development. Up until this point the Site III design was to title views with questions as had been defined by Kelly in the conjecture meeting. This episode began with an admittedly mundane conversation about the students not being interested in their questions (turns 117 to 135). During the first half of this episode Chris and I talked while Kelly and Alice quietly listened. I asked several questions to get information out about the context, to gain a better understanding of the contextual problems we were dealing with as a group. I also asked at least one generative design question which was not taken up by Chris. Then, at turn 136 (see Figure 59), it is actually Kelly who asks the generative design question about why at their school they named the views questions and if they could do it differently. Then Kelly begins to tell projective stories about how they could approach the starting of units differently. Then all three teachers begin to engage in discourse about changing the way they start units (turns 142 to 152).

Recall that Kelly had been bothered for some time by a feeling that something seemed out of place between what was happening in her classroom and what the Knowledge Building Communities principles seemed to be conveying. She expressed a feeling that what had been said about the principles in the meetings was not what she was seeing and doing in her classroom. It is from this point in the conversation (see Figure 59 - turn 136) that I cease speaking and the three teachers take up the redesign of how Knowledge Building could be
started in the future at their classrooms. The discussion ended with Kelly committing (see commissive statement in turn 152) to change her approach. Finally, as she reported in her embedded teacher case study Kelly acted on changing the way she began the unit by beginning with a blank view for the Le Moyen Age study.

<table>
<thead>
<tr>
<th>Turn</th>
<th>Caller</th>
<th>Type of Call</th>
<th>Type of Story</th>
<th>Theory Ref.</th>
<th>Speech Act</th>
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<tr>
<td>111</td>
<td>Kelly</td>
<td>GDO</td>
<td>Contextual</td>
<td>#1</td>
<td>117</td>
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<tr>
<td>118</td>
<td>Alice</td>
<td>Contextual</td>
<td>Question</td>
<td>119</td>
<td>120</td>
</tr>
<tr>
<td>119</td>
<td>Chris</td>
<td>Contextual</td>
<td>Question</td>
<td>121</td>
<td>122</td>
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<td>120</td>
<td>UR</td>
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<td>Question</td>
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<td>Chris</td>
<td>Projection</td>
<td>Question</td>
<td>127</td>
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<td>123</td>
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<td>124</td>
<td>Alice</td>
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<td>125</td>
<td>Chris</td>
<td>Question</td>
<td>Contextual</td>
<td>133</td>
<td>134</td>
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*Figure 58.* Site III meeting #4 - Chronologically-ordered Discourse plot study group meeting #4 February 9th, 2006. This episode tracks the conversation between myself and Chris and is about how new questions enter the Knowledge Forum database.
Summary

The contextual concerns that were raised by the Site III study group were similar to those that were raised by the Site II study group. These contextual concerns included time, curriculum and student abilities. But in the case of the Site III study group they worked forward on these problems by committing to experiment with the elements that they determined they could make suitable advances on. These commitments came after study group discussions about the contextual factors and projections had been explored about how things could be done differently.
The most notable episode is the one that occurred during the fourth study group meeting for Site III when the group moved to confront their typical way of starting a unit, the design that had been put forward by Kelly during the initial conjecture meeting. The role the Knowledge Building Communities principles played in framing this episode and other episodes is supported by teacher reports and the referencing of one or more of the principles at the beginning of the episode. The presence of an explicit reference to a Knowledge Building Communities principle clearly doesn’t ensure a commitment to take action as is represented in the Site II meeting episodes. However, when teachers frame their conversation with a Knowledge Building Communities principle, engage in projections about how they could change their practices and actually commit to testing these practices out in classroom, this has the potential to lead to changes both in their classroom practices and in their perceived understanding of the Knowledge Building Communities model.
CHAPTER 4: DISCUSSION

Overview

Crossing the “implementation gap” in one context, and then taking the innovation “to scale” in multiple contexts, represent challenges facing all efforts to reform education (Supovitz & Weinbaum, 2008). To improve implementation researchers have begun to define their approaches through sets of core principles (Brown, 1992; Brown & Campione 1994, 1996; Scardamalia, 1999). However, as Spillane and his colleagues have pointed out (2002), success rests in large part on a teacher’s comprehension of what the reform requires in their particular classroom. Direct instruction in principles misses a key element of implementation--the context into which the new model is placed must be transformed so “direct implementation” is not possible, as the “Study Group” model elaborated below suggests.

This research study examines study groups as a support for the implementation of the Knowledge Building Communities model. The design for study group meetings was intended to bring together the three core elements of educational implementation, the reform (i.e. the Knowledge Building Communities model), the teacher, and the context (Spillane, et al, 2002; Zhao et al, 2002). This study was therefore intended to explore the proposition that: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. The case reports and embedded teacher case studies suggest support for the proposition both through theoretical replication (results that contrast with targeted results for predictable reasons), as was the case with Site II and literal replication as in the case of Site III (Yin, 2003). These issues are elaborated in the following section.
The basic finding of this study is that study groups have the potential to improve teacher’s perceived knowledge about the underlying principles of the Knowledge Building Communities model while contributing to its implementation in the classroom.

The results also suggest that there is a complex set of factors that may affect the success or failure of an implementation undertaken using the study group format. For instance, the timing of the meetings appears to be a factor to be considered. If the study group is scheduled close to the time of actual implementation it seems teachers are less likely to use their time for reflection and design, but instead they focus on the immediate need to determine what to do next with the students (this was especially the case with Site II). And if study groups are placed too far apart the meetings don’t provide sufficient support for sustained cycles of experimentation and reflection.

The results also indicate the importance of including a university researcher, or someone acquainted with the principles of the educational model to be implemented, to assist with bringing the core principles into the study group’s discourse. However, as results suggest, the university researcher, as an outsider, may have difficulty being present or at least party to all of the discourse associated with the implementation. But when all of the members of the study group are present, results suggest that the study group provides an important “channel” for the reform message, with potential to affect perceived understanding of the innovation and the implementation. At the same time, when the group, as a frame for their design work, does not take up the core principles of the model there is evidence that the study group format is insufficient to avoid surface level implementations of the Knowledge Building Communities model. For example, Chris framed the group discussions not in terms of the model but in terms of the Knowledge Forum software.
Results also indicate that teachers who are actively involved in addressing their contextual concerns (e.g. English as a Second Language and its affect on student participation in the Knowledge Forum database) can, through cycles of classroom experimentation and study group discussion, perceive gains in their understanding and implementation of the Knowledge Building Communities model regardless of whether the implementation was, in their view, a clear success. This was Alice’s experience.

Further study is required to take these results beyond the limits of these cases. However, these findings suggest study groups provide a potentially beneficial means to support the implementation of principle-based innovations such as the Knowledge Building Communities model.

The results of the embedded case studies suggest that the framing that teachers brings to the experience has an influence on what they choose to attend to, and in turn how they interpret the reform messages that are being conveyed to them through discussion of the principles at the meetings. One teacher, Chris, framed the reform message in terms of a technology-based innovation and interpreted messages through this lens and differently from others. Alice framed the reform messages in terms of improving student participation (Democratizing Knowledge - principle #7), while Kelly eventually framed the model in terms of increasing the release of agency (Epistemic Agency - principle #5) to her students. For Kelly, in particular, the level of dissonance between the practices she had been taught by other teachers at the school about how to create a Knowledge Building Community and the reform messages that were being conveyed through the underlying Knowledge Building Communities principles discussed at study group meetings, ultimately prompted her to make significant changes to both her practices and her thinking about the Knowledge Building Communities model. Specifically, Kelly’s realization
that her way of starting Knowledge Building was not congruent with what the Knowledge Building Communities principles were stating, prompted a major re-design of her approach. Kelly and Alice were both actively involved in trying to understand the Knowledge Building Communities model in coordination with their enactment of the model in their classrooms. For Kelly, the discourse in the fourth study group meeting moved to a point where the teachers were exploring their own projective stories about new ways of starting Knowledge Building in their local context. The results also suggest that improving teacher understanding of the Knowledge Building Communities model through participation in study groups is not a very exact science. Comprehension of certain principles can be difficult even when the principles are explicitly described in the meetings. Likewise, the converse situation was experienced where individuals report improvements to their understanding and valuing of certain principles, despite the principle not having been a topic of discussion. Again, this was the case for both Alice and Kelly. This appears to provide support for the position that the Knowledge Building Communities model is a complex system and that to understand one principle is to understand others perhaps without even being fully aware of their existence. There appears to be a transactional relationship between perceiving gains in understanding a Knowledge Building Communities principle, using it to frame the discourse of the study group such that some aspect of the classroom implementation can be experimented with, and then returning to reflect on the practices in terms of one’s perceived understanding of the Knowledge Building Communities model.

With respect to the third research question (what is the nature of the discourse in a study group) the data suggests that the discourse in these study groups involved the participants bringing into relief their contextual concerns. This often occurred in response to first hearing
about a specific principle of the Knowledge Building Communities model. For Wendy and Don their contextual concerns eventually overwhelmed any possibility of experimenting with their implementation. It is not possible, based on the current research to determine if more frequent meetings, attended by all members of the study group, could have made it possible to sustain early gains. As it stands the Site II case study represents theoretical support for the proposition in that the teachers didn’t frame their work in terms of the Knowledge Building Communities principles and as a result moved to a surface-level implementation and a stated sense that they needed to start clean the next year. The following section traces evidence from each of the case studies in support of the proposition that: *discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them.*

**Evidence for the research proposition through analysis of case studies**

**Site I**

The proposition that was developed from the Site I case suggests the implementation of a principle-based innovation can be supported by engaging teachers in experimentation with their implementation in a study group environment where the Knowledge Building Communities model is explicitly discussed. Further, through reflection on the relationship between the model and contextual considerations the teachers advance their perceived understanding of the model especially with respect to those elements that are explicitly discussed.

In the Site I case both Rick and Zara engaged in experimenting with their implementation of the Rise Above principle (#4) and in turn brought the related principle of Embedded Transformative Assessment (#12) into consideration. For both teachers these principles gained in perceived value to the overall model as they reported improving their understanding of these
principles as a system. The contextual concerns for these teachers was less obvious to detect at first because their context was already that of an established Knowledge Building Community and as such the contextual concerns they eventually focused on were beyond those that were expressed by the teachers at either of the other two sites. As such, when these teachers referenced their contextual concerns they were directly referencing the Knowledge Building Communities model, with added commitment to move to higher levels of instantiation through additional experimentation. This is to say that the context had become the innovation and the innovation the context. This was not the case for the other two sites.

*Site II*

At Site II the contextual concerns that were raised fell squarely into concerns about the students, available time and the constraints of the required curriculum. Wendy had more difficulty than Don with finding time to engage her students in Knowledge Building in the set of views associated with racism but both teachers reported concerns about there not being enough time for Knowledge Building. For Wendy it turned out that the main study was being done not as a core element of her curriculum but was instead as an “add-on” and that she was directing students’ time on the computers. Interviews with her students suggest that they felt they didn’t get enough time on the computers and that several students saw the racism view as important study in which all students should participate. As student 56 stated:

“Racism, so other kids could see that it is important not to do discrimination and racism (because) some have done it once in their life.”

(Student 56 Site II, June 2005)

When Wendy moved the use of the Knowledge Forum software from racism to mathematics she also moved it into her curriculum in a way that appears from student reports to have allowed her to give them more time on the computers. The database analysis still indicates
issues with the breadth of contributing but the reading score clearly indicates that there was an increase in the level of reading in that view. The conversation with student 83 about the Actions Fractions!!! view suggests that at least one student saw the potential for this view to draw more into line with her perceived understanding of the Knowledge Building Communities model. Certainly this fitting of the Knowledge Building Communities model into the curriculum in such a way that it was being directed by the teacher sets a limit on the level at which the implementation can be situated in the model. On the surface it may be that Wendy was correct and that she needed the Knowledge Building Communities model to fit into her curriculum to increase the chances of it being implemented. It may also be that if this were to be allowed to take root and expand in the way indicated by student 83 then perhaps Wendy would see a new possibility for the implementation of the Knowledge Building Communities model in her local context. The school year ended before we could see how this possibility might have played out for her and her class. If there had been time for the students to demonstrate some success with improving their ideas related to mathematics this may have provided a level of visible student success (Owston, 2007) that would have led Wendy to see new possibilities for the Knowledge Building Communities model in her classroom.

The timing and frequency of the study group meetings at Site II was an important finding. It was determined that meetings in the mornings and at lunch made it difficult for all of the members of the group to be consistently present. A common planning time was made possible by the fact that their classes were working together on the implementation in the morning. However, this morning session led to another complication in that reflection on their practice was constrained by a need to also use this time to address demands of the day that lay in front of them. It was also the case that the morning planning meetings often occurred in the absence of
the university researcher or “critical friend” (Curry, 2008). As indicated earlier, a Knowledge Forum database was used to support and discuss implementation issues. The pattern of discourse that was identified in the Site I study group, a pattern that included references to the Knowledge Building principles as a frame for the discourse, was present in the on-line discourse of the Site II study group. Over an extended period of time the discourse in the database included references to Knowledge Building principles and discussion of implementation strategies to be tried in the classroom (i.e. projections). However as might be inferred from the short time-frame for the morning face-to-face meetings, many of which occurred without a university researcher, these conversations stayed close to contextual descriptions of the local site and existing issues and did not move to either consideration of the Knowledge Building Communities principles in relationship to these issues nor to making a commitment to try something different in the classroom.

Findings from the Site II case study provide insight into several key issues related to this study and in particular to research question #3. The proposition that interaction with the Knowledge Building Communities principles, in the context of a study group that is focused on implementation of the model, was refined through evidence gathered from the Site II case study. Support for the inclusion of a university researcher to bring forward the Knowledge Building Communities principles but also to support classroom experimentation was developed from this case. It was found that the Site II teachers wished to have their classes work together so the teachers would have a common frame of reference, but also that a balanced level of participation for the two classes was difficult monitor and maintain. However when asked, both Wendy and Don felt they would try having their classes work together again in the future. Logistically, the timing of the study group meetings needed to be at a time when the teachers could reflect on
their implementation and not feel pressure to put the plan into practice in the immediate future.

The potential importance of holding of these meetings at a time when the university researcher could be present was also revealed in the Site II case study. It was reasoned from the Site II case study evidence, that reducing the number of meetings to a set that were pre-defined so all members can attend may be helpful to the study group process. It was also reasoned this might raise the possibility that issues raised with respect to the context could have all members of the study group available to respond and that the applicable Knowledge Building Communities principle might be brought in to frame the conversation. In the absence of this opportunity the data from the Site II case study suggests that important aspects of the implementation may remain at the surface level (e.g. promoting the use of readings but not the critical stance promoted by the principle of Constructive Uses of Authoritative Sources). Finally, the issue of the nature of the curriculum topic not allowing time for full participation by the students was an important finding. Making sure that the teacher was comfortable with the place of the Knowledge Building Communities topic within their classroom curriculum appears to have made “all the difference” to whether students were given time to work in the Knowledge Forum database. It was also suggested from the evidence in this case that teacher competence with respect to the topic of study might have an influence on how the teacher approaches the operation of the Knowledge Building Communities model in their classroom. Both Wendy and Don felt much more comfortable teaching and discussing math than they felt they were at discussing a topic such as racism with elementary school children.

Site III

The proposition was re-worked going into the Site III case study with some of the logistical issues being refined to reduce the likelihood of meetings without a university
researcher present, time for reflection that wasn’t being overwhelmed by the demands of the day, and regular meetings to ensure the teachers would be able to engage in experimentation and reflection in an on-going cycle in the context of the study group meetings. This revision to the design of the meetings had the Site III study group meetings occurring Thursdays after school for a six-week period. The one logistical issue that was not remedied despite having been identified by the Site II teachers was that of having the study group teachers’ classes engage in a joint curriculum inquiry. On the surface teachers appear to view this as a way of having a common frame of reference; however, in the practical experiences of both Site II (Racism) and Site III (Light & Sound) the teachers reported issues with coordination between the classes. In the Site III case study Alice went so far as to state that this design feature for doing the Knowledge Building Communities model should be to avoid collaborations between classes unless they can begin at exactly the same time and coordination can be maintained throughout the study.

Both Alice and Kelly identified the fourth study group meeting as being a significant meeting related to changes in their thinking about the Knowledge Building Communities principles and how it was implemented in their local context. The discourse pattern identified in the Chronologically-ordered Discourse plot for the fourth meeting was found to be similar to the one from the Site I study group. This pattern appears to be indicative of a situation, at least in these two cases, where the participants in the meeting are bringing their contextual situation together with the principle-based model, reflecting on the relationship and proposing possible ways of moving forward with an instantiation of the model that will be potentially closer to the intended design as described by the Knowledge Building Communities principles. In the section of the Site III study group meeting #4 the problem being worked on was how to encourage students to see their ideas as improvable but this moved within the conversation to a
consideration of a new way of starting that would allow for more ideas to be entered in the database thereby releasing agency to the students.

What follows is a descriptive model to convey how context, the teacher, and the innovation may be dynamically related when a study group format is employed. But first I elaborate on the constructive nature of knowing which has a profound effect on all efforts to translate new ideas into effective action.

*The Constructive Nature of Knowing*

*Fish Is Fish* is a child story by Leo Lionni (1970). As reported by John Bransford and his colleagues (Bransford et al, 2005, p.53) this story is about a fish who is interested in learning about what happens on land but can’t directly explore land because it can only breathe in water. The fish is aided in efforts to gain understanding of what happens on land through his friend, a frog, who visits land and returns to describes things there. As the fish listens to the frog’s descriptions, he imagines everything to be fish-like; water is the only imaginable context. Birds are fish with wings; people are fish who walk on their tailfins, and so forth. This story illustrates difficulties in constructing new knowledge when everything is assimilated to current knowledge and context. In Piaget’s assimilation-accommodation terms, the fish assimilated the information to existing knowledge structures rather than accommodating new information by revising those knowledge structures to fit with a different context.

This “constructivist” story highlights the fact that constructivism aims to convey a theory of knowing, not a theory of teaching or pedagogy. The model below aims to tackle more directly the issues of context as it related to translating theory into practice and, in turn, crossing the implementation gap.
Crossing the implementation gap

What follows is a descriptive model that conveys a “constructivist story” of ways in which context affects implementation of a principle-based innovation such as Knowledge Building Communities. It conveys a shift from a strict assimilation to assimilation-accommodation framework for translating a principle-based innovation into action. The model of teacher knowledge that was developed by Mishra and Koehler (2006) is used to illustrate the importance of context, as backdrop for all teacher knowledge, permeating all decision making regarding content, pedagogy and technology. The Mishra and Koehler model is elaborated in figures 60 and 61 to describe (a) that different contexts serve a mediating function for study groups and teacher knowledge, and (b) that closing the implementation gap is a function of understanding principles at a sufficiently deep level that principle-based design can be embedded in work within the well-known context as well as in multiple and quite varied contexts.

![Diagram of Well-known Context, Implementation Gap, and Foreign Context](image)

Figure 60. Context permeates decision-making regarding content, pedagogy and technology. The “implementation gap” between a well-known and foreign context is large due to shallow understanding of principles. This prevents principle-based designs from becoming embedded in the well-known context.
An implementation gap (Supovitz et al, 2008) separates the well-known and foreign context. The implementation gap indicates the teacher-context-innovation challenge reported in the literature (see Spillane et al, 2002; Zhoa et al, 2002). A new reform needs to be understood in order to transform a well-known context in ways that are in keeping with the original intention of the developer (Spillane et al, 2002).

In Figure 60 the “implementation gap” is large, as suggested by the greater distance (compared to the gap in Figure 61) between the well-known and foreign context. The “Knowledge Building principles” are faded in both contexts to indicate that the practitioners who are new to these have a shallow understanding of how they apply in either their well-known context or the foreign context. Practitioners often claim to be applying “reform” principles, yet observers find little change in actual practice (Cohen, 1990). Closer investigation shows:

• principles are not clearly distinguished from existing practice
• new practices have been transformed into current procedures

Figure 60 suggests a pattern of “assimilation” without accommodation, as in the Fish is Fish story above where everything is reinterpreted in terms of the well-known context, without accommodation to new possibilities. Thus, as observed at both Site II and Site III, limited engagement in an assimilation-accommodation process that changes beliefs and understanding of new possibilities, leaves teacher knowledge so bound to the current, well-known context that the context is treated as the “state” of things rather than a context requiring creative problem solving so that it might accommodate more successful practices. Thus, for example, the teachers explain why the current state (student characteristics, curriculum, time limitations, etc.) prevent change--why the new model won’t work in their context. Alternatively, they report change but any action roughly in line with a principle is cited as evidence of that principle in use. We correspondingly
see in their accounts of the principles what might best be described as a shallow interpretation of them. Thus the implementation barely makes a difference in the well-knowledge context; teacher knowledge of content, pedagogy, and technology remain essential unaltered.

As in the *Fish is Fish* example, the fish’s understanding of the foreign context (land) is limited by the fact that everything is reframed in terms of the well-known context (water).

In summary, principle-based design that might transform the current context is limited because:

- the principles are defined at a surface or superficial level, and are reinterpreted almost exclusively in terms of the well-known context
- the well-known context remains basically unchanged even though the teachers might indicate the principles are operative in their class.

![Diagram](image)

*Figure 61.* Study group mediates dialectic process between well-known context and foreign context, whereby principles in the foreign context can be related to the well-known context. The “implementation gap” between a well-known and foreign context is narrowed by a deepening understanding of principles. This enables principle-based designs to become embedded in the well-known context.

In study groups teachers study relevant models or literature, or in the current case are facilitated by a university researcher, and relate principles to practice, asking:
• What is the deeper meaning of this principle?
• What is the closest my class comes to embodying this principle?
• How can I get closer?
• How can the current implementation be improved?

As Figure 62 suggests, with arrows between the different contexts, there is a dialectic between real and imagined possibilities pointed to by the principles. This model of classroom practices enables teachers to contemplate different contexts and their role as active agents of change. The “implementation gap” is narrowed (as suggested by the narrowing of the distance between the two contexts), with the following advantages:

• principles are distinguished from existing practice
• current procedures that are not in keeping with principle-based practices are noted
• the principles become design parameters—pointers to ways the classroom might be changed to go beyond current best practice

As practitioners experiment with new possibilities the well-known context is no longer an obstacle to change but rather something leading to increasingly deeper accounts of the principles. This allows the teacher to generate new designs, thus altering the well-known context, with consequent changes in their knowledge of content, pedagogy, and technology. Evidence for the shift comes from accounts of teacher study groups as a way to develop principled knowledge. This was particularly evident in the case of the Site III study group.

In summary, principle-based design that transforms the current context is enabled through deeper understanding of the principles. The teacher can then see:

• Implementation failures as failures to design effective conditions
• Implementation successes as opportunities for new design possibilities to go deeper yet
As principle-based design becomes possible the study group, through its new channel for communication about the reform message (i.e. Knowledge Building Communities principles and practices), begins discussion of the principle-based innovation in coordination with experimentation by one or more of the study group participants. The activities that occur with the children appear to be critical both for the teachers to see that the new way of teaching can be successful with their students in their own context and also to encourage alterations of the teachers’ understanding of the principles of the model in light of these successes. The converse may also occur where a teacher may not see the type of positive results for their students and therefore consider the model inappropriate for their context. The later situation was experienced by the Site II teachers both with respect to the curriculum and their perceptions about their students’ experiences of trying to be a Knowledge Building Community. However, it appears that if teachers can engage in experimentation this situation can push them to re-consider their teaching practices in terms of the new messages about how they might run their classrooms.

Figure 62. Study group discourse draws well-known context and foreign context closer together thereby reducing the implementation gap.
differently. This was the case for the members of Site III study group when they pushed through to develop a more student-led way of starting a unit.

It is interesting to note that Kelly found her understanding of the Knowledge Building Communities model, as she had initially understood it, to be over estimated. She initially thought that it was the theory that would need to be customized and then later that the students would need to do things differently. However in the end she stated that it was she that would need to change for the implementation to be successful. There is then a movement to cast all knowledge against the new reform messages (i.e. the Knowledge Building Communities principles) that are being conveyed by the principles, the most striking being a need to share and understand how the context relates to this new way of teaching and learning.

The study group approach, with the focus on discussion of the principles in relationship to the context and teacher’s experimentations in practice creates the professional development conditions in which teachers are able to begin working through their conception of teaching in terms of the Knowledge Building Communities model in their local context. However, if teachers frame the enterprise in ways other than the principles the resulting implementation can move to being a surface-level adoption of the most salient features such as the software or the use of authoritative resources by their students.

The ideal situation would be that the study group meetings would continue beyond the treatment period as is now the case at Site I where these meetings continue to occur on a weekly basis. Formalizing these types of meetings in the public school setting promises to be difficult as suggested by the issues that were encountered in this study. However the findings of this study also suggest that the creation of study groups as a dedicated channel for discussing innovations and new practices, is promising because it allows teachers to begin making sense of the
innovation in the context of their local practices. The preservation of a dedicated channel for innovation to make its way into the teachers’ network of communication is important for both fidelity and sustainability. However, if study group meetings are temporary, as was the case at Site III, there may still be advantages. At this site there was indication that the lasting effect was in terms of the teachers’ notions about what is possible. Further empirical research is needed to verify this claim. This study suggests that sustained meetings to support new ways of teaching and learning in schools is most important if the school context is to be transformed into a Knowledge Building Community. If the macro and meso context (Owston, 2007) doesn’t support the efforts of the teacher to transform their classroom then the implementation has less chance of succeeding. However, without this clear micro channel for the meaning of the reform message to be worked with then this is assuredly a recipe for the innovation to deviate from the intended design as suggested by the principles and it will suffer a lethal mutation (Brown, 1992) that will render it potentially unrecognizable to those who created the model and principles.

Discussion of the Knowledge Building Communities principles and the taking of action related to contextual concerns was an important step for the teachers at Site III as they set about making sense of the Knowledge Building Communities model in their local context. These attempts to try out the innovation in practice led to improved understanding of the underlying principles of the model for most of the participants. At Site III there was a drawing out of the contextual concerns by the members of the study group as they experimented with the implementation of the Knowledge Building Communities model in their classrooms. The contrasting Site II results, combined with the supporting evidence from the Site III case study, demonstrate support for the proposition that: discussing Knowledge Building principles increases
teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them.

Knowledge Building Communities model

The twelve Knowledge Building Communities principles have been of interest to many of those wanting to implement the Knowledge Building Communities model in their classrooms (Messina, 2002). Some have used them to analyze the work going on in a classroom while others have attempted to use them to design classrooms with fidelity to the original intentions of the developers. However establishing a Knowledge Building Community is challenging, and this may well be because the teachers who are running these classrooms don’t feel that they fully comprehend the principles on which the model is based (Moreau, 2002). This position appears to be supported by the evidence from all three of the case studies presented in this report. There seem to be levels of development that move a group from simply using the Knowledge Forum software and engaging in surface level activities to more advanced levels of engagement with the underlying principles of the model.

From the cases reported in this study Improvable Ideas (#2) seems to be the principle seen as most important in establishing a Knowledge Building Community, but this principle is also a point of concern if the students are not able to see their ideas as improvable. Along with improvable ideas teachers see Knowledge Building Discourse (#11) as being of high priority, as the ability to engage in conversation that progressively improve the knowledge being discussed are essential. This level of activity in the classroom and database was likewise associated with finding a way in for everyone who wanted to join the inquiry (Democratizing Knowledge – principle #7). It is conceivable that all of this could occur within a curriculum frame in that the teacher determines how the Knowledge Building Communities will operate and what they will
focus on. It is quite possible that a teacher could instantiate these three principles, while using a Knowledge Forum database, but still remain close to their previous practices. That is because at a surface level these principles convey how teachers who fashion themselves as operating their classrooms as constructivist learning communities would view their classrooms. So this surface level framework for the operation of a Knowledge Building Community could easily proceed within the existing curriculum structure.

The transition from the surface level of a Knowledge Building Communities implementation to a deeper level can in principle be achieved by addressing goals underlying any principle, then incorporating more principles, while moving to deeper levels of integration. However, the findings in this study suggest that a deeper level of implementation may be best facilitated by starting with the Epistemic Agency principle (#5). In this study the teachers started by thinking primarily in terms of individual student agency. In the course of considering individual agency they began to contemplate the relationship of each student’s ideas to the ideas of others. This, in turn, led them to more of a group focus--to the group gaining agency over the processes by which knowledge is being developed. When the Epistemic Agency principle (#5) is understood in this way teachers begin to make connections to other principles, and making these connections is an important determinant of moving to deeper levels of implementation. For example, they begin to consider the Community Knowledge, Collective Responsibility principle (#6) and the Real Ideas, Authentic Problems principle (#1). The Community Knowledge, Collective Responsibility principle (#6) suggests that the privilege of having agency over one’s ideas also carries with it a responsibility to contribute to the community, and that student’s authentic contributions help drive the discourse. Kelly demonstrated that she was able to make a genuine move to this deeper level when she handled the issue of agency in the Le Moyen Age
unit differently from the way she handled it in her previous investigation of Light & Sound. In the previous unit she started with the removal of student names from notes. There are several contextual concerns that work against a full implementation of this principle several of which were present in the cases. At Site II both teachers expressed concern that their students didn’t view their ideas as improvable. However none of the experiments that were put in place at Site II directly addressed this contextual concern. In comparison Alice expressed the same concern but took action to experiment with several ways of improving the discourse in her classroom as she felt that would assist her students in seeing their ideas as improvable.

Another hallmark of deeper engagement with the principle of Epistemic Agency (#5) is agency over their ideas to the point that there is rich diversity of ideas around the group’s research problems. This was the case for Kelly’s class when she chose to start her Medieval Times (Le Moyen Age) unit with a blank view and then she allowed as many ideas to enter as the students saw fit to add. It appears from the cases presented in this report that being able to reach this next level is difficult and requires significant alterations to the way teachers normally operate their classrooms. This was particularly true in the case of Kelly and Alice. Both teachers experienced the releasing of agency and the returns that this brought to their students.

The findings from Site I suggest an even deeper level of engagement with the Knowledge Building Communities principles. At this deeper level breakthroughs with one principle lead to deeper engagement with other principles, and there is a kind of cascading effect, with classroom processes as a whole reconstructed in a way more supportive of Knowledge Building pedagogy. Evidence from the database, student interviews and the teacher meetings suggest that the Site I teachers were focusing on the Rise Above principle (#4). While their focus was on “Rise Above,” analysis of discussions and experimentation in their classrooms shows that their insights
related to the principles of Idea Diversity (#3) and Embedded Transformative Assessment (#12). This pattern of focusing on a specific principle but perceived realization of gains with others suggests the principles are beginning to operate as a network of interacting parameters for classroom change. This fosters the continuous improvement of ideas and the integration of the Knowledge Building Communities model more generally across the curriculum. Thus while the concept of “Rise Above” is brought into the classroom design it is no longer defined at the surface level (e.g. use of the rise above note type). Rather, it extends to other rise-above inventions, both in terms of novel uses of the database and redefining classroom processes. It is also reflected in a “Rise Above” approach to the curriculum, to efforts to overcome obstacles, to the type of support provided to students.

Both Kelly (Site III) and Don (Site II) suggested that they were going to focus on the “Rise Above” principle (#4). But despite this commitment Kelly worked on other principles while Don implemented the surface features of the rise above principle, opting to use the rise above notes to clean-up the view. As indicated earlier, the intention of the Rise Above principle is much broader than “clean up a view”; it is part of an integrated strategy to continuously create a higher-order integration of ideas. It is certainly the case that the teachers at Site II initially intended to learn about the Rise Above note and use it to help with their problem of having messy views that had blocked them in the past from being able to move on. Unfortunately, the teachers at Site II had trouble from the beginning with whether their students could even see their own ideas as improvable (principle #2). It was only at Site I that teachers and their classes engaged in work that was related to rising above that was associated with advancing ideas and not just cleaning up notes in views. In coordination with the Rise Above principle (#4) is the principle of Embedded Transformative Assessment (#12) which is deeply associated with the
Rise Above principle (#4). Evidence from the student interviews suggests that the students of the teachers in the Site I study group may have still been using the Rise Above note to clean up the views but they also had the concept that this was assisting them in working with their ideas.

Summary

Taken together the finding from the case studies and the support of the embedded case studies of teacher change indicate support for the proposition: discussing Knowledge Building principles increases teachers’ perceived understanding of these principles and contributes to increasingly effective designs for implementing them. If the implementation was not based on the essence of a Knowledge Building principle, but rather a more superficial treatment or surface feature, the implementation was considered a surface level implementation. Where teachers were able through study group discussion about the Knowledge Building Communities model to discuss their local contextual issues and then set about designing possible solutions that move beyond the surface features and start building relationships between principles, we find a deeper level of implementation. Issues of curriculum, time and especially student abilities are all important contextual concerns that the study group must bear in mind as they start to work together. If handled through feasible experimentation the results can be insights and improvements to the designs for operating a classroom in a way that is more in keeping with the Knowledge Building Communities model and that moves to increasingly deeper levels of integration and implementation of the Knowledge Building principles.
CHAPTER 5: CONCLUSION

According to Cross (2007) professional designers learn to frame ill-structured design problems in terms of to-be-achieved design solutions that map onto the ill-structured problem space they have been given. This ill-structure problem/solution space is not unlike the one that teachers are expected to deal with when a new way of teaching is introduced and they must understand what the innovation involves and how to do it in practice. In this multiple-case design the teachers were supported through study group meetings and interaction with the author-- a university researcher --who had knowledge about how the approach had been implemented elsewhere. The perceived learning that occurred for the teachers who had framed the situation as a principle-based design problem may also find explanation in the manner in which designers work appositionally between the ill-defined problem space and their solution space (Cross, 2007, p.104). Instead of working from an explicit and complete problem definition the experienced designer appears to start in on the solution with an incomplete understanding of the ill-structured problem but as they move forward on their design they oscillate between the solution and the problem thereby improving their understanding of the problem as they advance their design. In terms of the current study this oscillation appears to have happened for several of the groups and in particular for several group members. Zara & Rick (Site I) and Kelly & Alice (Site III) were able to frame their problem spaces in terms of one or more Knowledge Building Communities principles and then were able to take action to attempt to design a solution to the principle’s implementation. Chris (Site I) had more difficulty and there is evidence that she framed her work in terms of the software not the principles. Wendy and Don (Site II) had the most difficulty moving forward. Explanations for these difficulties include the contextual concerns they were dealing with, the infrequency and composition of their study group meetings and their growing
sense that they need to completely redesign their approach and start again. It appears that where teachers weren’t able to frame the situation in terms of being a designable or desirable solution space, but instead saw an implementation problem, typically denoted by their fixation on one or more of their contextual concerns and/or solution options (e.g. rise above notes), they experimented less with the approach and made little progress in perceived understanding of the model (e.g. Chris, Don & Wendy).

It is clear from these case studies that principle-based study groups, if framed and executed properly, create a supportive professional development environment in which teachers are able to explore their understanding of an innovation, in combination with making actual attempts to implement the innovation in their local context. For this to happen the school context must be supportive of these attempts, as was the case at all of the sites in this study. However, not all school contexts are prepared to offer their teachers such leeway to experiment with their practices. But if educational innovations such as the Knowledge Building Communities model are to begin to be explored in more school settings, then Dewey’s call for “sites of experimentation” will need to be heard (Tannen, 1997). Without this orientation it is anticipated the results of any reform idea supported by study groups will yield implementations that are moving away from the intentions of the underlying principles, not toward them.

**Limitations of study**

*Convenience sample:* The teachers who volunteered to be part of this research may have been more likely to enact an innovation in their classrooms (Squire et al, 2003). Due to the technical requirements of this project (need for the supportive Knowledge Forum software environment) no attempt was made to randomly sample from all possible schools. This limitation should be
addressed in a future study that looks at the use of study groups to implement a principle-based model but samples more broadly.

*Experience of the teachers:* Across the three sites there was wide variation with respect to teaching experience and prior experiences with the Knowledge Building Communities model and software. Teaching experience and especially prior experience with the Knowledge Building Communities model, both positive and negative, may account for the results between the sites. However, with respect to Site II and III the years of teaching experience was in favor of Site II and the years of experience with Knowledge Forum was equivalent.

*Hawthorne Effect:* Some may view the results, especially those at Sites I and III, best explained in terms of participatory research that makes some change inevitable. But variations between the three sites, different levels of conformity to knowledge processes supported by the Knowledge Building Communities model, and different classroom practices and contextual concerns suggest issues well beyond the Hawthorne Effect (Brown, 1992).

*Bounded rationality:* Humans are rational beings that seek to solve problems in complex situations with limits on available resources including time and information (Simon, 1982). The limits to which the study groups could aspire to achieve understanding of the core elements of the Knowledge Building Communities model may have been held in check by my own understanding of the model. While I endeavored to understand it fully it is entirely possible that my understanding limited the progress of the study groups. There are two ways to surmount this problem: (a) the creators of the model develop assessment and evaluation systems to assist in measuring the degree to which a group is starting to become Knowledge Building Communities and (b) teachers make judgments about the model and create implementations that suggest advances to the theory and to its implementation. Throughout the text I talked of “perceived”
knowledge of the model to suggest that the model itself, and its principles, are improvable ideas themselves. That is, its principles apply to the model itself.

*Educational significance of study*

Learning scientists have begun to communicate their interventions through “first principles” in the belief that these principles will assist teachers in understanding how the innovation should be carried out in practice. As the implementation literature reviewed for this study suggested teachers are often accused of trying to subvert the innovation, yet the deeper truth is they may not understand it (Spillane, et al, 2002). Simply describing the innovation to the teachers has met with limited success (Cohen, 1999). The key appears to come from teacher recognition of how the innovation is different from how they taught before and willingness to design ways of enacting the innovation in practice to address their contextual concerns. For instance, Chris suggested that this way of teaching complemented the way she had taught in the past and that it was just going to be more “on-line” (Chris Post interview March 2006). However her description of the Knowledge Building Communities model suggests that she hadn’t yet grasped the significance of releasing agency to the students to the point that they might not organize themselves into equal groups around shared questions directed by the teacher. Her incorporation of the Knowledge Building Communities model into her existing way of teaching fits well with Cohen’s report about Mrs. Oblie (1999) where the teacher “skillfully” incorporated into her existing pedagogical approach the math reform that was being introduced to her.

The apparent necessity of adding of this new “channel” for the reform message to be heard represents what Chris Dede refers to as “design creep” (2003). To ensure the success of the primary innovation, that of the Knowledge Building Communities model, an additional innovation or “condition for success” (Dede, p. 6) needs to be added to the overall design. Where
the implementation of Knowledge Building Communities model is concerned this is a fitting addition in that the functioning of a study group is not unlike the Knowledge Building Communities model that the group is attempting to implement. Although not described or analyzed as such the teachers in this study did note on several occasions that what they were doing in the meetings seemed similar to what they were trying to get the students to do in the classroom.

Evidence from the Site II study group also suggests that teacher concerns over the abilities of their students and the constraints of the curriculum are important contextual concerns that need to be considered and addressed if the implementation is to be successful. Analysis of portions of the study group meetings suggest the benefit of including a “critical friend” in the study group meetings (Curry, 2008) may assist teachers in dealing with these types of concerns. Again, my explicit intention as the university researcher/participant-observer in these study groups was to bring forward into the conversation the underlying Knowledge Building Communities principles. Based on evidence from the Site II study group I also found that I moved to encouraging problem solving related to the contextual concerns raised by the teachers and that I was presenting stories of how others had gone about implementing the model in their own school contexts. Chronologically-ordered Discourse plots of selected episodes suggested a pattern that involved a mix of question asking, story-telling, and projections about a new way of implementing the Knowledge Building Communities model, often but not always linked to a commitment about what would be done next in the classroom. In particular, it was felt that projections tended to be associated with generative questions--‘what if’ and ‘how could we’ types of questions (Eris, 2003). Further research related to the existence of this discourse pattern is needed to verify its existence. The teachers at all three sites reported that they appreciated the
opportunity to share their experiences in this type of professional development setting and that they felt it gave them the opportunity to reflect on their understanding of the Knowledge Building Communities model.

Further research

Hmelo-Silver and her colleagues have been actively researching the mental models and levels of expertise that may be associated with the understanding of complex systems (Hmelo-Silver, Marathe & Lui, 2007). Their analysis focuses on the identification of the structures, behaviours and functions that are part of the system and the level at which individuals are at in terms of their understanding of these components (Ibid). In this light we could consider the Knowledge Building Communities model a complex system to be understood. Then the theory and practices associated with the Knowledge Building Communities model could be broken down into the structures, behaviours and functions that are involved in making the ideal implementations occur. The ultimate goal is to reduce the novice tendency toward a “reductive bias”, one that seeks to identify the simplest causal explanation (Jacobson, 2001; Perkins & Grotzer, 2000). In the case of the Knowledge Building Communities model these would be the components associated with surface level implementations.

Hmelo-Silver and her colleagues also suggest, based on the types of experts they have identified, that it might be more advantageous to facilitate learning of an innovation via more pragmatic goal-directed means as opposed to the more esoteric means of focusing on the principle-based functions of the system (Hmelo-Silver, Marathe & Lui, 2007). Hmelo-Silver and her colleagues (2007) also have reported in their study of expert and novice understandings of complex systems (i.e. aquarium and human respiration) that there were two distinct forms of expert knowledge, “pragmatic” and “hierarchical” (p.316). Of these two models they suggest that
it is the pragmatic expert’s knowledge, grounded in practice, represents a more likely candidate to address practical questions (e.g. how to keep fish alive in the aquarium). This may be the type of practice-related expertise that is being built in these study group meetings as teachers are trying out new ways of teaching and deepening their understanding of the underlying principles of the model. Finally, Hmelo-Silver and her colleagues go on to suggest that the pragmatic expert level of understanding may be a more suitable instructional goal as it can have explicit targets set for it that are visible in practice (2007, p. 327). Cast in terms of the findings of this study the study group format would appear to be an attempt to bridge the pragmatics associated with the reality of implementing the model and the connection to the underlying principles of the Knowledge Building Communities model.
REFERENCES


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APPENDIX A

Socio-Cognitive and Technological Determinants of Knowledge Building
(Scardamalia, 2002)

1. REAL IDEAS, AUTHENTIC PROBLEMS
Socio-cognitive dynamics: Knowledge problems arise from efforts to understand the world. Ideas produced or appropriated are as real as things touched and felt. Problems are ones that learners really care about—usually very different from textbook problems and puzzles.
Technological dynamics: Knowledge Forum creates a culture for creative work with ideas. Notes and views serve as direct reflections of the core work of the organization and of the ideas of its creators.

2. IMPROVABLE IDEAS
Socio-cognitive dynamics: All ideas are treated as improvable. Participants work continuously to improve the quality, coherence, and utility of ideas. For such work to prosper, the culture must be one of psychological safety, so that people feel safe in taking risks—revealing ignorance, voicing half-baked notions, giving and receiving criticism.
Technological dynamics: Knowledge Forum supports recursion in all aspects of its design—there is always a higher level, there is always opportunity to revise. Background operations reflect change: continual improvement, revision, theory refinement.

3. IDEA DIVERSITY
Socio-cognitive dynamics: Idea diversity is essential to the development of knowledge advancement, just as biodiversity is essential to the success of an ecosystem. To understand an idea is to understand the ideas that surround it, including those that stand in contrast to it. Idea diversity creates a rich environment for ideas to evolve into new and more refined forms.
Technological dynamics: Bulletin boards, discussion forums, and so forth, provide opportunities for diversity of ideas but they only weakly support interaction of ideas. In Knowledge Forum, facilities for linking ideas and for bringing different combinations of ideas together in different notes and views promote the interaction that makes productive use of diversity.
4. RISE ABOVE

Socio-cognitive dynamics: Creative knowledge building entails working toward more inclusive principles and higher-level formulations of problems. It means learning to work with diversity, complexity and messiness, and out of that achieve new syntheses. By moving to higher planes of understanding knowledge builders transcend trivialities and oversimplifications and move beyond current best practices.

Technological dynamics: In expert knowledge building teams, as in Knowledge Forum, conditions to which people adapt change as a result of the successes of other people in the environment. Adapting means adapting to a progressive set of conditions that keep raising the bar. Rise-above notes and views support unlimited embedding of ideas in increasingly advanced structures, and support emergent rather than fixed goals.

5. EPISTEMIC AGENCY

Socio-cognitive dynamics: Participants 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.

Technological dynamics: Knowledge Forum provides support for theory construction and refinement and for viewing ideas in the context of related but different ideas. Scaffolds for high level knowledge processes are reflected in the use and variety of epistemological terms (such as conjecture, wonder, hypothesize, and so forth), and in the corresponding growth in conceptual content.

6. COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

Socio-cognitive dynamics: Contributions to shared, top-level goals of the organization are prized and rewarded as much as individual achievements. Team members produce ideas of value to others and share responsibility for the overall advancement of knowledge in the community.

Technological dynamics: Knowledge Forum's open, collaborative workspace holds conceptual artifacts that are contributed by community members. Community membership is defined in terms of reading and building-on the notes of others, ensuring that views are informative and helpful for the community, linking views in ways that demonstrate view interrelationships. More generally, effectiveness of the community is gauged by the extent to which all participants share responsibility for the highest levels of the organization's knowledge work.
7. DEMOCRATIZING KNOWLEDGE
Socio-cognitive dynamics: All participants are legitimate contributors to the shared goals of the community; all take pride in knowledge advances achieved by the group. The diversity and divisional differences represented in any organization do not lead to separations along knowledge have/have-not or innovator/non-innovator lines. All are empowered to engage in knowledge innovation.

Technological dynamics: There is a way into the central knowledge space for all participants; analytic tools allow participants to assess evenness of contributions and other indicators of the extent to which all members do their part in a joint enterprise.

8. SYMMETRIC KNOWLEDGE ADVANCEMENT
Socio-cognitive dynamics: Expertise is distributed within and between communities. Symmetry in knowledge advancement results from knowledge exchange and from the fact that to give knowledge is to get knowledge.

Technological dynamics: Knowledge Forum supports virtual visits and the co-construction of views across teams, both within and between communities. Extended communities serve to embed ideas in increasingly broad social contexts. Symmetry in knowledge work is directly reflected in the flow and reworking of information across views and databases of different teams and communities.

9. PERVASIVE KNOWLEDGE BUILDING
Socio-cognitive dynamics: Knowledge building is not confined to particular occasions or subjects but pervades mental life—in and out of school.

Technological dynamics: Knowledge Forum encourages knowledge building as the central and guiding force of the community's mission, not as an add-on. Contributions to collective resources reflect all aspects of knowledge work.

10. CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES
Socio-cognitive dynamics: To know a discipline is to be in touch with the present state and growing edge of knowledge in the field. This requires respect and understanding of authoritative sources, combined with a critical stance toward them.

Technological dynamics: Knowledge Forum encourages participants to use authoritative sources, along with other information sources, as data for their own knowledge building and idea-improving processes. Participants are encouraged to contribute new information to central resources, to reference and build-on
authoritative sources; bibliographies are generated automatically from referenced resources.

11. KNOWLEDGE BUILDING DISCOURSE

Socio-cognitive dynamics: The discourse of Knowledge Building Communities results in more than the sharing of knowledge; the knowledge itself is refined and transformed through the discursive practices of the community—practices that have the advancement of knowledge as their explicit goal.

Technological dynamics: Knowledge Forum supports rich intertextual and inter-team notes and views and emergent rather than predetermined goals and workspaces. Revision, reference, and annotation further encourage participants to identify shared problems and gaps in understanding and to advance understanding beyond the level of the most knowledgeable individual.

12. EMBEDDED AND TRANSFORMATIVE ASSESSMENT

Socio-cognitive dynamics: Assessment is part of the effort to advance knowledge—it is used to identify problems as the work proceeds and is embedded in the day-to-day workings of the organization. The community engages in its own internal assessment, which is both more fine-tuned and rigorous than external assessment, and serves to ensure that the community’s work will exceed the expectations of external assessors.

Technological dynamics: Standards and benchmarks are objects of discourse in Knowledge Forum, to be annotated, built on, and risen above. Increases in literacy, twenty-first-century skills, and productivity are by-products of mainline knowledge work, and advance in parallel.
Conjecture Meeting

Instructions to the group:

In this school context, what will the resulting design for Knowledge Building be like? What should we look for as indicators that Knowledge Building is occurring in this setting? Please use the Knowledge Building principles to build a group conjecture regarding the design for Knowledge Building in this setting.

Knowledge Building Principles:

REAL IDEAS, AUTHENTIC PROBLEMS

IMPROVABLE IDEAS

IDEA DIVERSITY

RISE ABOVE

EPISTEMIC AGENCY

COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

DEMOCRATIZING KNOWLEDGE

SYMmetric KNOWLEDGE ADVANCEMENT

PERVASIVE KNOWLEDGE BUILDING

CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES

KNOWLEDGE BUILDING DISCOURSE

EMBEDDED AND TRANSFORMATIVE ASSESSMENT
APPENDIX C

Rating the Knowledge Building Principles:

Knowledge of Principles

NAME_________________

Years of Knowledge Building Teaching Experience_________________

Please put a vertical line at the point that corresponds to your response. 0 indicates that the principle means you feel it has no value to the design of a Knowledge Building Community while 5 indicates you feel the principle is of absolute necessity to the design of a Knowledge Building Community. You can choose any point on the line. Please only make one clear mark.

EXAMPLE:

0______1______2______3______4______5

REAL IDEAS, AUTHENTIC PROBLEMS

0______1______2______3______4______5

IMPROVABLE IDEAS

0______1______2______3______4______5

IDEA DIVERSITY

0______1______2______3______4______5

RISE ABOVE

0______1______2______3______4______5
APPENDIX C (Continued)

EPISTEMIC AGENCY

COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

DEMOCRATIZING KNOWLEDGE

SYMMETRIC KNOWLEDGE ADVANCEMENT

PERVASIVE KNOWLEDGE BUILDING

CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES

KNOWLEDGE BUILDING DISCOURSE

EMBEDDED AND TRANSFORMATIVE ASSESSMENT
APPENDIX D

Rating the Knowledge Building Principles:
Value of Each Principle in the Context

NAME_________________

Years of Knowledge Building Teaching Experience_________________

Please put a vertical line at the point that corresponds to your response. 0 indicates that the principle means you feel it has no value to the design of a Knowledge Building Community while 5 indicates you feel the principle is of absolute necessity to the design of a Knowledge Building Community. You can choose any point on the line. Please only make one clear mark.

EXAMPLE:

0______1______2______3______4______5

REAL IDEAS, AUTHENTIC PROBLEMS

0______1______2______3______4______5

IMPROVABLE IDEAS

0______1______2______3______4______5

IDEA DIVERSITY

0______1______2______3______4______5

RISE ABOVE

0______1______2______3______4______5
APPENDIX D (Continued)

EPISTEMIC AGENCY

COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

DEMOCRATIZING KNOWLEDGE

SYMMETRIC KNOWLEDGE ADVANCEMENT

PERVASIVE KNOWLEDGE BUILDING

CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES

KNOWLEDGE BUILDING DISCOURSE

EMBEDDED AND TRANSFORMATIVE ASSESSMENT
APPENDIX E

Rating the Knowledge Building Principles:
Value of the Principle to Overall Theory

NAME_________________

Years of Knowledge Building Teaching Experience_________________

Please put a vertical line at the point that corresponds to your response. 0 indicates that the principle means you feel it has no value to the design of a Knowledge Building Community while 5 indicates you feel the principle is of absolute necessity to the design of a Knowledge Building Community. You can choose any point on the line. Please only make one clear mark.

EXAMPLE:

0        1        2        3 | 4        5

REAL IDEAS, AUTHENTIC PROBLEMS

0        1        2        3        4        5

IMPROVABLE IDEAS

0        1        2        3        4        5

IDEA DIVERSITY

0        1        2        3        4        5

RISE ABOVE

0        1        2        3        4        5
APPENDIX E (Continued)

EPISTEMIC AGENCY

COMMUNITY KNOWLEDGE, COLLECTIVE RESPONSIBILITY

DEMOCRATIZING KNOWLEDGE

SYMMETRIC KNOWLEDGE ADVANCEMENT

PERVASIVE KNOWLEDGE BUILDING

CONSTRUCTIVE USES OF AUTHORITATIVE SOURCES

KNOWLEDGE BUILDING DISCOURSE

EMBEDDED AND TRANSFORMATIVE ASSESSMENT
APPENDIX F

Participant Teacher Survey

Knowledge Forum®/School Environment/Content Area/
Functioning of the principle-based study group

NAME_________________

Years of Knowledge Building Teaching Experience_________________

Please put a vertical line at the point that corresponds to your response. 0 indicates no familiarity/applicability/value while 5 indicates that there is excellent familiarity/applicability/value. You can choose any point on the line. Please make only one clear mark for each statement.

EXAMPLE:

0______1______2______3______4______5

CURRENT TEACHER FAMILIARITY AND FACILITY WITH THE KNOWLEDGE FORUM SOFTWARE ENVIRONMENT

0______1______2______3______4______5

CURRENT STUDENT FAMILIARITY AND FACILITY WITH THE KNOWLEDGE FORUM SOFTWARE ENVIRONMENT

0______1______2______3______4______5

APPLICABILITY OF THE KNOWLEDGE BUILDING COMMUNITIES APPROACH TO THIS SCHOOL SETTING

0______1______2______3______4______5

TEACHER’S DEPTH OF UNDERSTANDING AND PEGAGOGICAL PROFICIENCY IN THE DOMAIN OF STUDY

0______1______2______3______4______5
APPENDIX F (Continued)

STUDENTS’ DEPTH OF KNOWLEDGE AND UNDERSTANDING IN THE DOMAIN OF STUDY

0 1 2 3 4 5

HOW CLOSE WERE YOUR PREVIOUS CLASSROOM PRACTICE TO THOSE OF A KNOWLEDGE BUILDING COMMUNITY?

0 1 2 3 4 5

HOW WILL/DID DISCUSSION OF THE KNOWLEDGE BUILDING PRINCIPLES EFFECT THE DESIGN THAT YOU IMPLEMENTED IN YOUR CLASSROOM?

0 1 2 3 4 5

HOW MUCH “CUSTOMIZATION” DO YOU/DID YOU EXPECT TO DO IN ORDER TO HAVE A SUCCESSFUL IMPLEMENTATION OF KNOWLEDGE BUILDING?

0 1 2 3 4 5

HOW WOULD YOU RATE THE IMPORTANCE OF HAVING A UNIVERSITY RESEARCHER AS PART OF THIS PROCESS?

0 1 2 3 4 5

HOW WOULD YOU RATE THE VALUE ADDED BY TAKING THE KNOWLEDGE BUILDING COMMUNITIES APPROACH IN RELATIONSHIP TO YOUR PREVIOUS CLASSROOM PRACTICES?

0 1 2 3 4 5

COULD YOU HAVE DONE THIS ON YOUR OWN WITHOUT THE INVOLVEMENT OF A UNIVERSITY RESEARCHER?

0 1 2 3 4 5
APPENDIX G

Teacher Interview Protocol

NAME_________________

1. What is your understanding of the Knowledge Building Communities (KBC) approach? Do you feel you understand it deeply? How did you come to this understanding (readings, workshops, demonstrations etc...)?

2. How does the KBC approach relate to your previous way of teaching? Please explain.

3. How suitable is the KBC approach in your particular school context?

4. Do you anticipate this way of teaching will be valuable for your students? Please explain.

5. Do you anticipate that all of the members of your class will be able to participate in the KBC? If not, why not? How can we alter the design immediately to ensure everyone has an opportunity to participate?

6. Do you anticipate a need to make any “design customizations” to help the KBC design framework (e.g. the Knowledge Building principles) work in your classroom?

7. What does Design-based Research mean to you? Please specify what you feel the word “design” means in this context.

8. As a form of professional development how do you anticipate your participation in this principle-based study group will compare to other forms of professional development? Do you anticipate it will change your role? Please give details.

9. Please describe your feelings about the focus that was/will be placed on design in the context of this study group.

10. Have you previously participated in collaborative work with other teachers (e.g. curriculum development, research etc..)? Did this work ever include a design researcher? Do you anticipate that the presence of a design researcher will make a difference? If so, what will be different?
APPENDIX G (Continued)

11. The functioning of this technology-enhanced study group will require/did require that we use(d) an on-line environment to document and discuss the evolving designs, design issues and advances. What do you anticipate will be/feel was the nature of these interactions in this environment? Have you used such an environment before?

12. There will also be/were face-to-face meetings once every month. What do you anticipate will be/feel was the nature of these meetings and how will they/did they contribute to the functioning of the study group?

13. One of the main goals of the on-line and face-to-face discourse will be/was to help focus attention on the design framework for Knowledge Building (i.e. the KB principles). How do you feel about this focus? Do you think it will help/helped or hinder(ed) your implementation attempt? Have you ever before focused on the implementation of something through its first principles?

14. Can you please describe how you anticipate the principle-based study group will function/functioned over the coming/past months? What will be/were the processes we will use/used to advance the design of knowledge building in this school context?

15. Specifically, what contribution do you anticipate/did you feel the on-line discussion forum will contribute/ did contributed to the design of the Knowledge Building Community in your classroom.

16. Here is the list of 12 principle (present list of titles summarized in Appendix B (without Appendix A attached - i.e. without the definitions). Could you please do a "think-aloud" about each of these principles noting what you know about them and how you would go about getting more of each of these principles into your classroom environment.
1. You and your classmates are engaged in knowledge building about _________________.

2. Can you tell me about the study?

3. How did the study start?

4. Who decided on the main problem you are studying?

5. What ideas or problems have you and your classmates been trying to understand?

6. Who decides on how your class builds knowledge together?

7. What does a wonderful knowledge building day look like in your class? Why do you consider this “wonderful”?

8. What materials have you been using to support your knowledge building?

9. Can you show me a part of your Knowledge Forum® database where there is good interaction and the ideas seem to be improving? Why did you pick this view or section?

10. How do you think this knowledge building work should end?

11. What do you think your class should move onto next? Is that related to this study or is something new? Please explain your choice.
12. If you were trying to describe knowledge building to someone who didn’t know about it what would you tell him/her is the most important thing to thinking about in order to make it work?

13. What would you tell this person was something they should make sure the students do as a class to make sure they did Knowledge Building “right”?

14. Can you tell me how you and your classmates decide if you are making progress? What do you and your classmates do when you aren’t making progress?
APPENDIX I

Themes/Categories, Descriptions and Examples

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<th>Theme</th>
<th>Category</th>
<th>Description</th>
<th>Examples</th>
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| Context    | Time           | Any reference to time in relationship to the local implementation of the KBC model | “So I have to take other school time to deal with that in a different way.”
|            |                |                                                                             | “I allotted more time because we had scheduled that we were going to do that so I’ve been making a point to revisit it and talk about it.” |
| Students   |                | Any reference to student abilities in relationship to the local implementation of the KBC model | “And I think especially the whole idea of Knowledge Building is so new to them. We’ve got to start with what they know. Like whenever we teach anything, but start with what they know.”
|            |                |                                                                             | “I think with my kids, one of the things that I foresee as being like a roadblock is that they don’t necessarily question ideas.” |
| Curriculum |                | Any reference to school-based curriculum as an issue in relationship to the implementation of the KBC model | “If it is connected to the social studies unit, even if it hits a little bit a snag, but it depends on their understanding, then it will be much more a part of our classroom.”
|            |                |                                                                             | Well in terms of Real Ideas, Authentic Problems, here because we’re constrained with the curriculum, it’s locally not as applicable as it would be in an ideal situation. |
| Technology |                | Any reference to computers or hardware availability in relationship to the implementation of the KBC model | “And there are many afternoons, like Tuesday afternoon, where I’m like, I wish I had them (the laptops) right now because it would tie in, but they’re in Debbie’s room at that time.”
<p>|            |                |                                                                             | “Well, some of the views won’t open with a picture. And then I went this morning and it’s gone.” |</p>
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<th>Description</th>
<th>Examples</th>
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| Experimentation               | Students seeing ideas as improvable           | Any reference to an attempt to assist students in seeing their ideas as improvable | “Because they were very much rooted in this idea that, I’m either right or I’m wrong, and they’re looking at me for the right answer.”  
“So just getting them more comfortable with that, that they could question each other, and they could question me.”  
“In fact, today we’re going to go and we’re going to group them all together. And all the questions that are the same, we’re actually going to rise above!”  
“I’m getting more of the impression that you’re trying to synthesize and get to those big ideas that I was talking about earlier.”  
“Before I was forcing it. I was forcing the kids to have (KB) talk, planned (KB) talk situations.”  
“So giving them that power and that control and that responsibility, it’ll be interesting to see how I’m going to get my students there, because right now they’re very dependent.”  
“So in my particular case, it was, you know, we had ESL issues in terms of script writing, and we also had special needs issues in terms of learning disabilities that made writing difficult.”  
“I can see how this would be very frustrating for the students, so trying to find someone who can translate for him in terms of what his ideas are.”  
“They were just reading and putting down what they thought, but they’re not backing it up with anything, or giving the link to the site, so that’s our new goal.”  
“I was wondering, what scaffold are they using to signify that this is an authoritative source, or information we got?” |
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<th>Theme</th>
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<th>Examples</th>
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<tbody>
<tr>
<td>Teacher</td>
<td>Knowledge</td>
<td>Any reference to a teacher’s knowledge about the KBC model (e.g. KBC principles)</td>
<td>“Well it’s…something felt off. Before it felt like I was forcing it too much. It’s much more…it’s easy for me to see where they’re going with this.” Well rethinking the way we (teachers) are thinking.</td>
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<tr>
<td>Skills</td>
<td></td>
<td>Any reference to a teacher’s skills associated with implementation of the KBC model (includes KBC pedagogy and/or KF software)</td>
<td>“In terms of kids being on the view and contributing, is that something that everybody should be on?” “If the teacher does not know enough about the program (KF) and what’s out there, I can’t give that to my students.”</td>
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<tr>
<td>Innovation</td>
<td>KBC Model</td>
<td>Any reference explicitly to a KBC principle</td>
<td>(For specific KBC principle descriptions see Socio-cognitive dynamics - Appendix A)</td>
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<td></td>
<td>KF Software</td>
<td>Any reference to the KF software environment (e.g. notes, views, scaffolds, problems, database, etc…)</td>
<td>(For specific KF references see Technological dynamics - Appendix A)</td>
</tr>
<tr>
<td>Questions</td>
<td>Generative Design Question</td>
<td>Any reference questioning how things could be done differently (e.g. What if, how could we, have we thought of?)</td>
<td>“Is there a way that the ideas that are current, that they’re being represented in the classroom, like is there chart paper up, is there a bulletin board that kind of mirrors the ideas that are being worked on in the database?” “If we were to start another discussion, would we want to organize things differently so that the kids were more, we would schedule more time so that they are aware of the most current notes and it’s up to date?”</td>
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<td>Question (i.e. information seeking)</td>
<td>Any reference that seeks information to improve understanding of the current situation</td>
<td>“Why did we end up with questions, like for the views why did we end up putting our views with questions?” “So you are just into it, can you just describe where you are at?”</td>
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| Stories| Contextual | Any reference that describes the existing teaching and learning situation at the school (including stories about the KBC implementation)                                                               | “Today we had a KB Talk I had printed out the rise above and one note that I felt might lead us and none of them were the topic of conversation.”
|        |            |                                                                                                                                                                                                             | “This is what we did. It doesn’t mean the science people can’t go discuss things with knowledge forum people just because those are the groups that they’re in, but it also means the science people also have a task that they’re supposed to be completing.” |
|        |            |                                                                                                                                                                                                             | “We have done that before where a child sat and reflected on a piece of video of the classroom and literally wrote a note.”
|        |            |                                                                                                                                                                                                             | “Here is a little story. One class was moving onto a new thing and they didn’t know what to call it so they just called the view Grade 4’s new study. So that was the name of the view for weeks even though they did state to study, space, earth, and weather.” |
|        |            |                                                                                                                                                                                                             | “I think this year I am going to introduce rise above at the very beginning, like week two, so they’re getting use to “okay, well all these notes are together, so if you want to do a build-on, so that there are build-ons to rise above.”
|        |            |                                                                                                                                                                                                             | “They could map it. Who had power, who were the people with no power, and maybe because that will be something concrete, sometimes it’s easy to see it when it’s other than when it’s your own.” |
| Speech Act | Commissive | Any reference that indicates there is an explicit intention to try something out in the classroom                                                                                                             | “I’ll take ownership of that as far as moving it along.”                                                                                                                                                 |
|         |            |                                                                                                                                                                                                             | “I could try that with my students as they’re starting to come up now with the questions that they’re going to have.”                                                                               |