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Recent research has reaffirmed that what teachers know and are able to do is one of the most important factors influencing student learning (Darling-Hammond & Sykes, 1999; Fullan, Hill, & Crevola, 2006). Yet, the longer I am in the teaching profession, the more I recognize both the complexity of teachers’ work and also the importance of ongoing professional learning in the process of “becoming a teacher.” Indeed, Hirsh (2009) notes that “improving professional learning for educators is a crucial step in transforming schools and improving academic achievement” (p. 3).

Ongoing professional learning is fundamental to our ability as educators to respond to the changing and complex demands of our profession and also to meet the varied needs of the learners with whom we work. In the quest to create classroom environments where all students are supported, challenged, and successful, we need to acknowledge the importance of our own learning and the learning of our colleagues.
We also recognize that over the last 30 years, as the “science” of teaching has been systematically studied, approaches to professional learning, and their context and content, have also changed. For example, we know that teachers’ contexts have changed in ways that they have not experienced or seen in classrooms before. The content of what is taught has also changed. Increased attention to literacy and numeracy, for example, requires a deeper and more extensive knowledge and understanding than in the past. Changes in both the context and content of teaching necessitate comprehensive approaches to professional learning; specifically, approaches that support new and experienced teachers as they develop a deep knowledge of literacy and numeracy pedagogy with the aim of meeting the range of student needs they address on a daily basis (Literacy and Numeracy Secretariat, 2007).

Features of Effective Professional Learning

While there is no one approach that is singularly better than all others, the research base on professional learning has helped distill specific features that are effective and meaningful and make a difference for teachers. Darling-Hammond, Wei, Andree, Richardson, and Orphanos (2009) report, for example, some basic principles for designing professional learning:

- Professional development should be intensive, ongoing, and connected to practice.
- Professional development should focus on student learning and address the teaching of specific curriculum content.
- Professional development should align with school improvement priorities and goals.
- Professional development should build strong working relationships among teachers.

(pp. 9–11)

Likewise, other researchers and authors note similar principles (see Broad & Evans, 2006; ASCD, 2009). The Literacy and Numeracy Secretariat of Ontario (2007) elaborates on the features of high quality professional learning, stating that it “must be grounded in inquiry and reflection, be participant-driven, and focus on improving planning and instruction” (p. 1). They emphasize the importance of learning that is focused on communities of practice rather than individual teachers. As well, when collective work involves the exploration of specific problems in teaching, new learning can be implemented in classrooms and changes in practice sustained. Importantly, the Secretariat notes that professional learning must be “connected to and derived from teachers’ work with students—teaching, assessing, observing, and reflecting on the processes of learning and knowledge production” (p.1).

OISE School-University Partnership Projects: Supporting Teacher Learning

Initial Teacher Education at OISE is guided by seven principles:

- Teaching excellence
- Research-based and research-driven
- Cohort-based learning communities
- Coherence
- Faculty collaboration
- School/field/university partnerships
- Equity, diversity, and social justice
The School-University Partnerships: Research Into Practice initiative is one of many in OISE’s Initial Teacher Education program; it is focused on enhancing learning experiences and strengthening partnerships between OISE’s field partners and the university. First introduced during the 2002/2003 academic year, this endeavor provides grants up to $2000 to OISE initial teacher education instructors in recognition of exemplary projects intended to support and extend school-university relationships. The projects reap learning benefits for a range of stakeholders, including students in schools, teacher candidates, associate teachers, administrators, and teacher educators. The projects encourage inquiry, creativity, and knowledge building for the improvement of teacher education and the improvement of student learning.

This publication, *Partnerships for Professional Learning: Literacy and Numeracy Initiatives*, is a special issue in OISE’s professional learning series and features recent collaborative projects. The articles in the issue describe partnerships between OISE faculty and school-based educators who are engaged in literacy- and numeracy-focused professional development. As you read about each of the projects, you will see varied purposes for and approaches to teacher learning (e.g., coaching, mentoring, action research, think-alouds, technology tools, demonstration lessons, feedback strategies, lesson study, and launching a journal). The projects reflect the principles and elements of effective professional learning described in the literature. These diverse projects integrate theory and practice, and support collaborative learning among all stakeholders, as the participants engage in inquiry, application, and classroom-based research. Together, university and field educators are enhancing their skills and knowledge and de-privatizing their practice, while also developing shared beliefs and understanding aimed at improving student learning. The authors also reflect on their collaborations to determine the impact of their actions and to ascertain how their work together in communities of practice might guide future action that is focused on literacy and numeracy and other potential areas of instructional and program improvement.

**Creating Learning Cultures**

What is most apparent from the literature on professional learning is that in order to realize the potential for student learning, educators must focus on the learning cultures they are creating for themselves. The authors and partners in the projects described in this publication are helping to create and shape powerful learning cultures that address the learning needs of educators across the teacher education continuum from pre-service to in-service. When more opportunities exist for educators to learn from and with one another, and when there is greater investment in the study of the teaching profession and the sharing of practices, I believe we can change deeply rooted norms of privacy. Ultimately, “by expanding the base of ideas, and connecting practitioner wisdom to the broader research and knowledge base of the teaching profession, the possibilities for improvement of student learning are boundless” (Rolheiser, 2009, p. 8).

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Our sincere appreciation goes to the Literacy and Numeracy Secretariat of Ontario for supporting the partnership projects highlighted in this publication. The work of the Secretariat continues to strengthen the teaching and learning environment in Ontario and beyond.
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I also wish to extend my deep gratitude to OISE instructors, teacher candidates, graduates, associate teachers, students in our partner schools, and school-university administrators who have participated in or lent support to the projects outlined in this publication. Your willingness to collaborate in school-university partnerships increases the chances that collectively we can better support the learning of all of the students in our care. Teacher learning and student learning are important and inextricably bound together … Thank you for working toward these interdependent goals.

References


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EXPLORING MATHEMATICS TALK IN ELEMENTARY CLASSROOMS

Cathy Marks Krpan

Abstract
This research project documents the journey of six elementary educators as they explored meaningful ways to teach mathematical talk in their classrooms. The educators met six times to discuss and share the different approaches they used to assist their students in communicating their mathematical thinking. Specific teaching tools, such as the Math Talk Chart and the Problem Reflection Sheet were examined. The research group also identified the challenges and benefits related to explicitly teaching the skills needed to enable mathematical talk in their classrooms.

Project Focus
• How can educators effectively infuse talk into their mathematics program?
• How can educators assist students in the talk process?
• What are some of the challenges and benefits of infusing mathematics discourse into mathematics classrooms?
Developing student metacognition is a critical outcome of the teaching and learning process. Metacognition refers to the awareness people have of their own thinking and the ability they have to regulate their thinking (Wilson, 2001). In order for students to develop a deep understanding of the mathematical concepts they are acquiring, they need to be aware of their own learning processes and be able to explain their own thinking to others (Fosnot & Dolk, 2001; Marks Krpan, 2001). Accordingly, metacognitive strategies need to be taught explicitly for students to be able to monitor their thinking effectively (Given, 2002). Many educators today are exploring teaching strategies that encourage and support student metacognition in the mathematics classroom.

Mathematical discourse, a method that enables students to explore and assess their own thinking, can increase student achievement (Fosnot & Dolk, 2001). While learning mathematics by communicating their thinking through numbers, images, and words, students can deepen their understanding of what they are learning and consolidate their own learning (NCTM, 2000). By encouraging students to talk about their mathematical thinking, teachers can provide their students with opportunities to rehearse their thinking and link ideas together (Zolkower & Shreyar, 2007).

This research project investigated how educators can infuse talk into the mathematics classroom in junior and senior kindergarten and grades three, five, six, and seven. In the process, associate teachers from the Peel District School Board explored different approaches that can enable meaningful talk within the mathematics classroom and can assist students in sharing their mathematical thinking.

**Stages of the Project**

**Initial investigations**

During the first step of organizing this research project, I investigated current issues in elementary mathematics education that were of concern in the classrooms of associate teachers connected with OISE’s Initial Teacher Education program. I noted that many educators were using journals and exploring ways to engage their students in communicating their thinking in mathematics. This was due, in part, to specific district and provincial initiatives in the area of mathematics education. Several educators in OISE’s program schools expressed an interest in exploring mathematics discourse as a way of promoting and encouraging students to develop a deep understanding of the mathematics they were learning.

**Selecting a research approach**

The next step involved the choice of a research format that would allow educators to explore different strategies in their classrooms and share their insights with each other. I decided that the most effective approach would be action research, an approach whereby participants would meet on a regular basis to discuss issues related to the research and to share student work samples and teaching strategies. Action research allows educators to explore and readily reflect on their teaching practice (Carr & Kemmis, 1987). The collaborative aspect of action research, which takes place during meetings of educators, provides opportunities for participants to challenge their personal beliefs and share their insights (Mohr, 1991). The action research approach can also promote change in classroom...
practice because educators conduct the research as an integral part of their teaching process (Suter, 1998). The participants were invited to select which areas of student discourse they wanted to explore, and this allowed them to investigate a variety of issues related to communication in mathematics (McNiff, 2001).

**Planning the meetings**

As project coordinator, I organized the action research meetings and invited educators from program schools to participate in the research. Two email messages were sent out to school principals and associate teachers describing the research and asking for their participation. The associate teachers who first responded were invited to participate in the research. Limiting the number of participants allowed for maximum sharing and communication. The project participants included two primary educators, three junior educators, and one intermediate educator. Each participant had more than five years teaching experience. During each meeting participants shared their insights and discussed the challenges and benefits of organizing talk in their mathematics program. We met six times from February 2008 to June 2008.

**Data Collection and Analysis**

Four methods of data collection were used during each meeting: audiotaped discussions, written reflections, student work samples, and researcher’s notes. For each two and a half hour meeting a set of questions was prepared to guide discussions and engage the participants in sharing their insights. Information gathered from all four data collection methods was triangulated to identify common themes and patterns in the research. Transcripts of the taped discussions were analyzed to identify key themes, which are described below.

**Considering the talk process in mathematics**

The participants commented that students do talk during mathematics lessons, but usually the process is not structured and monitored in a formal way. Although they would organize students in groups to solve problems, they did not formally monitor or structure the talk process. The mathematical discourse that took place during group work was often very limited; students mostly shared answers and rarely elaborated on their thinking or compared problem-solving strategies. Mathematical discourse in the participants’ classrooms mostly took place during whole group lessons, when they would pose questions about the content they were teaching. Teachers valued mathematical discourse, but were not always sure of how to infuse it meaningfully into their mathematics program. Time was an issue, and any activity perceived as taking time to implement was a concern to some in the group. They felt that the math curriculum consisted of a lot of concepts that needed to be addressed, but they were aware that they did not need to teach all of the expectations in the mathematics program. However, the group noted that many activities, such as sports practices, concerts, and various school-wide event days, took place at their schools, and these reduced precious classroom time with their students.

The group did concur that there were benefits of organizing student talk in the mathematics classroom, including gaining insight into student learning, enabling students to consolidate their
thinking, and improving students’ overall mathematical problem solving. When presented with Chapin, O’Connor, and Anderson’s (2003) Five Talk Strategies in Math Class (see Figure 1), the participants acknowledged that they had not yet considered these approaches to facilitating students’ talk in the classroom.

**Five Talk Strategies in Math Class**  
(Chapin, O’Connor, & Anderson, 2003)

1. **Revoicing** [Clarifying what a student has said]  
   “So you are saying that it is an odd number?”  
   “Do you mean that you would divide the square into fourths?”

2. **Asking someone to restate someone’s reasoning**  
   “Can you repeat what he just said in your own words?”  
   “Can you explain what Mary just did?”  
   “Why did Parvinder add the 1 to the 5?”

3. **Asking someone to apply their reasoning to someone else’s reasoning**  
   “Do you agree or disagree? Why?”

4. **Prompting students for further participation**  
   “Would someone like to add on?”

5. **Using wait time**  
   “Take your time ... We’ll wait.”

Figure 1. Five Talk Strategies in Math Class

Many participants felt that they may have inadvertently used one or two of these strategies in the past but were unaware of their impact on the talk process. Many said they could include more talk between students, specifically by inviting them to comment on another classmate’s reasoning or strategy. They also pointed out that many of these strategies would not take a lot of time to implement in their teaching and yet would have an impact on their math lessons.

As the research progressed, several participants noted that by becoming more aware of these talk strategies, they were able to ask better questions to prompt more insightful talk during their lessons. They also observed that this did not take up more time, but rather enabled them to use the time they had in a more constructive manner with their students. The participants who taught junior and intermediate students shared that many students had a very negative view of mathematics, feeling that it was not relevant or important to their lives. By infusing more group talk into their mathematics programs, the participants felt that these students would be able to make more personal connections in their thinking and make links to real-world concepts.

**Teaching the social skills of mathematics discourse: The talk chart**

One of the challenges of infusing talk into the mathematics program was a student’s lack of knowledge and/or skills in talking about mathematics to each other. Participants who taught language arts
acknowledged that they use a variety of teaching strategies in their language programs to promote discussions around the books that students read. However, in their mathematics program, math talk was not often formally addressed or taught. With this in mind, the group examined an adapted version of the T-chart that is often used in cooperative learning contexts (Gibbs, 2001). This chart is used to establish expectations for behaviour when students work cooperatively on small group activities. However, the chart topics that the participants in this study used were changed to reflect issues directly related to mathematical discourse (see Figure 2). The group discussed whether this talk chart could assist their students and help facilitate math discourse in their classrooms. Many of the participants decided to explore this chart as part of their mathematics program.

![Math Talk Chart]

In a kindergarten class, the teacher and her students created a book with images to demonstrate the talking strategies they used when they explored number concepts, including counting. The book posed questions such as, how do we know when we are listening? The students’ responses were recorded on each page of the book. This rendered the chart more conducive to the learning needs of her kindergarten students. The topics were similar to the chart, but were expressed in a more personal way for her students to understand.

Participants teaching the primary grades, created charts with their students through whole-class discussion and then posted these in the classroom for ongoing reference. They found that through this process they could discuss and highlight some of the issues that might be challenging in group work and student-to-student discourse in mathematics. One teacher said that the process was very helpful in clarifying specific social issues of talk among his students, such as how to disagree with someone in a positive way. The concrete examples listed in the chart acted as guides when the students worked in small groups during math class or participated in whole-group discussions. He noted that students would often refer to the chart in order to guide their discourse (see Figure 3).

In the junior and intermediate grades, teachers provided the chart to their students in small groups and invited them to fill it out according to what issues they felt were appropriate. In one instance, a teacher provided the small groups with sticky notes so that the students could first write their own ideas on the sticky notes and place them on the chart before discussing them with their group. The
educators saw that the creation of the chart enabled the class to discuss and reflect on issues that might be encountered when sharing their math ideas in groups. They found that the students’ insights about how they felt when sharing their thinking with others were enlightening. Many students expressed some anxiety around sharing, especially if they were with other students who were more proficient in mathematics. In the teachers’ experience, it was helpful to have these issues brought out in the open, and this enabled them to build awareness of some cooperative social skills through using the chart.

Over the course of the research, the group concluded that the Math Talk Chart improved the process of math discourse in their classrooms. All participants agreed that the chart is an effective resource to assist students in discussing and sharing mathematical thinking.
The chart made students aware that any one problem could have multiple approaches for solving. According to some participants, students were more open to sharing ideas, as they felt “protected” by the expectations in the chart. One participant explained, “My students are taking more risks and have become less intimidated to share ideas.” Another pointed out that her students were calmer when disagreeing and that there were fewer arguments. Sometimes the teachers reviewed the chart before the students began a group activity in mathematics. They noted that students listened more readily when others explained their strategies. The content of talk also improved. Students analyzed strategies and discussed their own thinking more readily. The talk that took place when the chart was being created also helped students become aware, in a very concrete manner, of how to talk during math class.

### Structuring the group work talk

Several participants decided to explore talk in their classrooms by integrating more group-work activities. A grade six teacher decided to examine group problem solving in depth, and she wrote down her observations as the students explored a volume activity. As the activity progressed, she posed specific questions, such as, how do you know and how can you prove your thinking? She found that by stopping to pose these questions to each group more discussion took place among the student groups and they were able to explain their thinking more effectively. As her awareness of talk increased through the action research meetings, she became more active in promoting deeper student discussion.

In a grade seven classroom, one teacher decided to structure the talk during a group problem-solving exercise in order to promote better mathematics discourse. Instead of providing each group with a problem and inviting them to solve it and present the results to the class, the teacher wanted to provide more opportunity for his students to reflect on different approaches and collaborate more on finding the solution. Previously, he had observed that during group work one or two students would be the ones solving the problem, while the others in the group looked on. He decided to create a problem reflection sheet that could guide students in their thinking and problem solving (see Figure 4). He provided questions to guide the students’ thinking. Students used one side of the sheet to work independently on the problem. The questions on the other side of the sheet guided the students as they shared their insights with each other. The problem reflection sheet provided students with discussion prompts as they explored different solutions in their group. They also provided the teacher with some data regarding the process that led up to the final answer for each group. And, as students used the sheet, there was more collaboration and focused discourse around the mathematical concepts. The teacher felt that the problem reflection sheet could support the students in the early stages of group work, particularly when they were developing the skills of sharing ideas and listening to others.

Students with special needs also appreciated using the problem reflection sheet because it provided organization and structure for their writing and discussions. A grade five teacher modified the sheet to use with her students, and she, too, found that it helped provide some key guidelines to support student talk. The group of teachers noted that some students, those who might not need the guidance of the problem reflection sheet, might feel more comfortable sharing their insights using a
more open-ended structure. From this perspective, the teachers stressed the importance of meeting the needs of all students in expressing their thinking.

In reflecting on group problem solving, some participants noted that it was helpful to group the students according to their mathematical abilities. Even though they had discussed and implemented guidelines around math discussions, students who were weaker in mathematics were often intimidated in taking risks and sharing. By grouping the students according to their abilities, the students were able to share more readily, and they felt more comfortable making suggestions. The teachers often changed the groupings of students according to the mathematics topic being addressed, which avoided group stereotyping. In this way the educators were also able to modify the math problems to meet the diverse needs of their students.

Impact
This study has contributed to ongoing research that explores the infusion of discourse in the mathematics classrooms (Stein, 2007; Hyde, 2007; Chapin, O’Connor, & Anderson, 2003; Humphreys & Boaler, 2005). In particular, because of its focus on teachers’ experiences, this research provides insight from the perspective of educators in authentic classroom contexts. The project identified specific teaching approaches that support and improve student talk. It provided educators with knowledge of how they can support students as they investigate mathematical ideas and how they can help students improve the communication of their mathematical thinking. This research can also assist others who are interested in how educators can meaningfully integrate and teach math talk as an integral part of their classroom programs, thus providing students with the key skills for mathematical discourse.

Figure 4. Problem Reflection Sheet

Problem Reflection Sheet

Question: You have 10 gray socks in a drawer and 20 blue socks in a drawer of your dresser. If you wake up in the morning and reach in, with the lights off, how many socks must you take out to be sure that you have a pair that are matching?

My Work
What do I know from this question?
How can I solve this mathematically?
What questions do I still have?
This is how I tried to solve the question:

My Group’s Work
How did we explain the question to each other?
What different methods of solving the questions did we come up with?
What questions did we still have?
This is how we tried to solve the question:

Note: space would be provided for student responses under each prompt
This research project is aligned with current Ontario Ministry initiatives in which mathematical discourse is considered a key component of a strong mathematics program (Ministry of Education, 2003, 2004, 2006). Results from this study have been used to support district consultants and teachers as they explore ways to effectively implement talk in their mathematics programs. The results of this study have also been shared with school districts and presented at conferences across North America.

Implications for Teacher Education
This project has continued to build partnerships between the Regional cohort in the OISE Initial Teacher Education program and OISE’s program schools. Several of the participants have shared their explorations with other staff members at their schools. The collaborative nature of the action research process has enabled the participants to get to know associate teachers from other program schools and to share insights and resources. The knowledge that the participants acquired through this action research process may assist OISE’s future teacher candidates as they embark on teaching mathematics and as they work with these associate teachers and mentors in their teaching placements. The findings of this study will be infused into the mathematics course for teacher candidates at OISE as well as a graduate-level course that explores research in mathematics education.

Practical Applications
The talk charts, problem reflection sheets, and teaching strategies that educators used during the project to promote talk in their mathematics classrooms offer practical approaches that other educators can readily use in their classrooms. By documenting the journey of educators in their own classrooms, this study provides insight into how these approaches can be successfully implemented in the hectic reality of daily classroom life. Educators can implement any of the strategies mentioned in this study in a way they feel will best suit the learning needs of their students.

Next Steps
The participants in this project concluded, unanimously, that the action research process enabled them to strengthen their teaching and grow professionally with their colleagues. They felt that it was important that universities develop partnerships with the field in order to support and continue to investigate teaching and learning processes. Some questions that we want to continue to pursue include: How can educators continue to facilitate rich mathematical discussions in their classrooms? What other strategies or resources can effectively support this process? What impact does mathematical discourse have on student problem solving?

As educators and researchers, we need to continue to explore the integration, assessment, and teaching of student discourse. As an essential part of learning in mathematics, this process can enable students to make deep connections in their understanding of mathematical concepts and also assist teachers in gaining insight into their students’ thinking.
References


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ENGAGING LITERACIES: HARNESING TECHNOLOGY TOOLS FOR LITERACY DEVELOPMENT IN MULTILINGUAL CLASSES

Jim Cummins

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• Jim Cummins: Canada Research Chair in the Department of Curriculum, Teaching and Learning, OISE

Project Partners

• York Region District School Board: Lisa Leoni, vice-principal
• Peel District School Board teachers: Patricia Chow, Zarina Khan, Padma Sastri, and Alison Shiraishi
• Teacher candidate at OISE: Nandita Dias

Abstract

This pilot project identified a variety of promising technology tools that can be used to promote literacy development for all students, and particularly for linguistically and culturally diverse students. Project participants pursued dual language book-making strategies. A significant number of these books have been compiled, are being transformed into electronic form, and will be showcased, using Desktop Author software, on the OISE Language as Resource website. This website, to be launched in April 2009, focuses on the available knowledge base regarding multilingualism in education and the strategies for teachers to enable students to use their home language as a cognitive tool within the classroom. The website will include an electronic resource book, written by the project participants, on the implementation of dual language book-making strategies.

Project Focus

The overall goal of the project was to explore how certain low-cost technology tools can be used to promote and enhance literacy development among students with diverse cultural and linguistic backgrounds. The specific questions were as follows:
Teaching in schools where linguistic and cultural diversity is the norm presents both challenges and opportunities. This small-scale pilot project explored and documented some of the opportunities that exist in diverse classrooms for increasing students’ engagement in literacy development through innovative use of a number of technology tools.

Students’ learning is enhanced when they are supported in relating their pre-existing knowledge to new learning (e.g., Bransford, Brown, & Cocking, 2000). For English Language Learners (ELLs), the integration of new learning with prior knowledge involves connecting what students know in their first language (L1) to English. Thus, if students have developed literacy in their first language, their literacy development in English (L2) will likely be enhanced by the use of instructional strategies that help these students transfer their knowledge, concepts, and literacy skills from L1 to English.

All the teachers who participated in this project had previously been involved in the SSHRC-funded project “From Literacy to Multiliteracies: Designing Learning Environments for Knowledge Generation within the New Economy” (Early, Cummins, & Willinsky, 2002). The project described here represents a continuation of some of the research directions that were initiated in the SSHRC multiliteracies project, and it also represents an exploration of how relevant instructional strategies can be disseminated in an effective and low-cost manner.

The SSHRC multiliteracies project demonstrated a promising avenue for promoting English literacy skills: the encouragement of non-English-speaking students to initially write in their L1 and then to work on translating their L1 writing into English with the assistance of peers, teachers, or community volunteers. Even when students are not yet literate in their L1 (e.g., students in the early grades who were born in Canada), the creation of dual language texts, usually with the assistance of parents, provides not only a strong affirmation of students’ cultural and linguistic identities but also increases opportunity for parental involvement.

Active engagement in literacy development is fundamental to student success in school. This has been extensively demonstrated; for example, data on the reading attainment of 15-year-olds in almost 30 countries shows that “the level of a student’s reading engagement is a better predictor of literacy performance than his or her socioeconomic background, indicating that cultivating a student’s interest in reading can help overcome home disadvantages” (Organisation for Economic Cooperation and Development, 2004, p. 8).
Stages of the Project
There were three stages to this project. First, a set of “tech tools” that showed promise for increasing literacy engagement among linguistically diverse students was identified through consultation with teachers participating in the project and with other teachers.

Second, the participating teachers implemented in their classrooms a variety of dual language writing strategies involving a number of different genres. Samples of students’ work were collected by the teachers and discussed among project participants. Following are examples of dual language reading and writing activities implemented by teachers:

- writing stories or projects (e.g., relating to aspects of their home cultures) initially in English and then working with parents or community volunteers to create L1 versions of these stories or projects to be published in both electronic and hard copy versions (e.g., http://thornwood.peelschools.org/Dual);
- writing short dual language and English-only “flip books” made from recycled paper, in which students focus on particular curricular content, retell this content, relate it to other knowledge and experiences, and reflect further on the implications of the content;
- writing stories or about experiences, initially in L1 and then working with peers, teachers, and/or community volunteers to translate these stories into English and produce a dual language book. This strategy was particularly useful for newly arrived students whose English language skills were minimal.

Third, the project team met to compile samples of students’ multilingual work and to plan the content of an electronic resource book for teachers and pre-service teacher candidates.

Data Collection and Analysis
The data collected during this project included the dual language books written by students and the observations of their teachers regarding the impact of this instructional strategy on the students. The data consisted of interviews with teachers and ongoing discussion among project participants about the process and outcomes of dual language instructional strategies. The impact of this instructional strategy was not analyzed quantitatively because the study was essentially a demonstration project. The logic can be expressed simply: *Actuality implies possibility*. In other words, the demonstration that students at various grade levels and with varying levels of English proficiency have written and published engaging dual language books and projects implies that this classroom strategy is possible. Thus, the project demonstrates that these bilingual instructional strategies are feasible and should be considered by all teachers of linguistically and culturally diverse students.

All the teachers in the project observed a high level of motivation and engagement from students who were involved in dual language writing. Students took considerable pride in their accomplishment. Furthermore, an additional common observation was that parental involvement was facilitated by the acceptance of the family language as a legitimate instructional strategy and cognitive tool. Parents of younger children in the project frequently volunteered to help their children translate stories from English to L1 and some were able to write or word-process the L1 versions of these stories for their children.
An example of a story based on a folk tale from the home culture is Hira’s text entitled “Always Tell the Truth” (see Figure 1). When she wrote this story, Hira was a grade five student in Lisa Leoni’s grade five ESL class.

Figure 1. Hira Ahmed’s Story
Figure 1. Hira Ahmed's Story

When the boss saw Tom, he asked “What do you have to give me?” Tom responded “I only have $40 dollars to give you.”

The thief boss asked Tom “Why did you tell as the truth? If you told me you had nothing to give me, I would have believed you.”

Tom looked straight into the eyes of thief boss and said “I will not leave here without my family.” Thief boss thought for a moment and finally decided to let Tom’s family go as well.

Tom’s family gathered together and continued their day. They enjoyed their picnic by talking, laughing, telling jokes, eating, singing and dancing.
Hira also shared her reflections on the opportunity to use her home language in the classroom (see Figure 2).

**Hira Ahmed’s Reflection**

1. When I am allowed to write stories in Urdu, I feel very comfortable because when I write English it’s difficult for me. If I write in Urdu I feel very comfortable because in Pakistan People speak in Urdu and we also write in Urdu. Teacher give me a little work to do but I want to be smart and I want to do a lot of work. Teacher gives the little work because I can’t speak in English. I want to be smart to tell teacher I know English very much.

2. Yes I enjoy reading in Urdu because its easy for me and I can understand it. In English, I can’t understand very well. So, its not so easy for me to understand English. I can read it very well but its difficult for me to understand it. In Urdu I can read anything.

3. When I am allowed to use Urdu in class it helps me because when I write in Urdu and then I look at Urdu words and English comes in my mind. So its help me a lot. When I write in English, Urdu comes in my mind. When I read in English I say it in Urdu in my mind. When I read in Urdu I feel very comfortable because I can understand it.

Figure 2. Hira Ahmed’s Reflection

Hira’s reflection illustrates the frustration that many ELL students feel when they are unable to express their ideas and intelligence within the classroom. She observes, for example: “Teacher give me a little work to do but I want to be smart and I want to do a lot of work. Teacher gives the little work because I can’t speak in English. I want to be smart and tell teacher I know English very much.” She also observes that in Urdu she can read anything, but this is not the case in English. In her experience, the two languages reinforce each other; “when I write in Urdu and then I look at Urdu words and then English comes in my mind.”

Hira’s observations here link closely with the academic research on bilingual development and the achievement of linguistically diverse students (e.g., Cummins, 2001). The research highlights the importance of students’ identity in the learning process and also the interdependence of L1 and L2 academic skills in the learning process. The research data in the academic literature, together with the experiences of learners such as Hira, highlight the importance of teaching for transfer of conceptual knowledge and skills across languages (Cummins, 2001).

Two other examples of the work that students carried out in two languages come from Padma Sastri’s elementary ESL class. Ms. Sastri explored what happened when students were asked to pick words from the regular curriculum books they were reading and then to write out the associations they could make between these words and their background knowledge (see Figure 3).
The second example focuses on a student’s response to a book that he has read (see Figure 4).

Figure 3. Potatoes

Figure 4. Heroes
These examples illustrate that students from multilingual backgrounds can use both languages productively in the classroom to express their knowledge, insights, and imagination. The teacher does not need to know the languages of the students to implement this strategy. Parents obviously know the language of the home and typically become enthusiastically engaged in their children’s creative endeavours by providing their support.

Impact
The initial list of technology tools that were identified as worth exploring to enhance literacy development within the classroom was further discussed and elaborated on by the participating teachers. These tools are outlined in the following:

Technology Tools to Support Academic Engagement of Students in Multilingual Schools

e-Lective Language Learning
Any text can be imported into the e-Lective environment. This program can read any text to students, provide bilingual or multilingual dictionary supports, and enable students to practice words they previously did not know. There is also support for different kinds of writing, such as personal response and critical response to texts.

Google Language Tools Web Translation
New non-English-speaking students can write something in their first language, and an automatic translation into English can be generated by the computer (this is possible for many languages). The translation is not perfect but is usually sufficient to provide the teacher and the other students with the gist of what the student has written. Then the teacher, or an editing team of peers, can work with the student to edit the translated text into appropriate English. The student might then “publish” a dual language text or book on a school or community website.

Google Earth
This program provides an excellent way for students to explore and talk about their country of origin. They can “zoom into” well-known sites (e.g., the Taj Mahal in India), integrate images into a PowerPoint presentation about aspects of their cultural or linguistic background, involve parents or grandparents in the process, and develop spatial and map-reading skills.

Desktop Author
This program is an electronic book-publishing program. Text can be entered or pasted in, and visuals such as images/ and video clips can also be included. When a book has been completed, it has pages that turn electronically, and it can be uploaded directly to a website or emailed as an attachment.

Sister-Class Connections
Projects can be undertaken jointly with a sister class, in the same city or across the world, using English and also potentially a student’s home language. Tools such as Digital Page Author or PowerPoint can be used to publish students’ collaborative work.
Vocabulary Exploration
PowerPoint templates can enable students to learn new vocabulary in depth; for example, they can find L1 equivalents, synonyms/antonyms, definitions, images, and word usage in sentences. Students can work in groups to explore five to ten new words per week, and subsequently the teacher can generate a quiz using the words that all the groups have explored.

Glossary and Quiz Generator
These utilities are available for free on the WordSmyth site. Teachers (or students) can generate customized glossaries or vocabulary quizzes that target words that they have encountered in texts or other curricular materials.

Blog Generator Software
There are sites that facilitate students generating blogs on topics of their own choice. Their blogs can be shared with students in a sister-class network and can generate online critical discussion on issues of either curricular relevance or of interest to the students.

Sites for Sharing Student Book Reviews
Various sites enable students to upload and share their book reviews (e.g., http://www.buildingrainbows.com/). These sites can be highly motivating for students to read books critically within a shared, and possibly international, community of readers.

Implications for Teacher Education
The electronic resource book that will be available when the OISE Language as Resource website is launched in April 2009 will be freely available for download for all teacher education programs across Canada and internationally. The electronic resource book uses the Desktop Author software program, which simulates a hard-copy book insofar as it has the format of a book and the pages turn. However, unlike a hard-copy book, audio and video components can be added. Thus, the final version of the resource book will include video clips of students talking about their book-making experiences and video clips of participating teachers discussing the impact of this instructional strategy. The project coordinators anticipate that the electronic resource book will fill a gap in literacy development and serve as a bridge to English literacy by showing how students’ home languages can be employed productively in the classroom.

Practical Applications
The technology tools outlined above represent a set of immediately applicable resources that can be implemented in virtually any classroom. Many of these tools enable teachers to translate research and theory directly into practice. For example, the fundamental principle that educators need to build on students’ pre-existing knowledge (Bransford, Brown, & Cocking, 2000) is often ignored in the case of newcomer ELL students because their prior knowledge is encoded in their L1, and teachers have no access to that language. However, these students can be encouraged to write in their L1, drawing on their experiences and ideas, and teachers can then explore various options for translating this writing into English. A machine web translation using Google Language Tools may not be highly accurate
or elegant, but it can provide the teacher or a group of the newcomer students’ peers with the essential meaning that he or she is trying to communicate and enable them to edit the machine translation into more appropriate English.

Next Steps
The results of this pilot project have been most encouraging, and the project has been extended into several other highly diverse elementary schools in both the Hamilton Wentworth District Board of Education and the Toronto District School Board. Students in the participating schools have read student-authored dual language books that have been displayed on both the Dual Language Showcase site (http://thornwood.peelschools.org/Dual) and the multiliteracies site (www.multiliteracies.ca). The showcasing of their work has inspired them to begin creating their own books, which will be displayed on the OISE Language as Resource website when it is launched in April 2009. The enthusiasm of the students is well captured by the observations of one of the teachers involved in the follow-up project:

“My students have become writers overnight!! They all had their stories drafted, edited, and written for today. Most also had gone home asking for help translating to their home language. They keep asking for the website with dual language books. This has become a family project.”

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Jim Cummins is a Canada Research Chair and a Professor in the Department of Curriculum, Teaching and Learning, OISE. His research focuses on literacy development in multilingual school contexts as well as on the potential roles of technology in promoting language and literacy development.
GOING GRAPHIC: USING COMICS AND GRAPHIC NOVELS TO BOOST THE LITERACY OF ENGLISH LANGUAGE LEARNERS

Larry Swartz

Project Coordinator
- Larry Swartz: Coordinator of Central elementary cohort, OISE

Project Partners
- Sixty-three primary-junior teacher candidates from the 2007/2008 Central cohort
- Sixty-three associate teachers from the Central cohort, within either the Toronto District School Board or the Toronto Catholic District School Board.

Abstract
An important initiative of the 2007/2008 OISE Initial Teacher Education program in the Central elementary cohort was to support English Language Learners (ELLs) in every classroom. This project, Going Graphic, was designed to help teacher candidates consider ways to use comics and graphic novels to boost literacy among ELLs during their practicum experiences. As part of their language arts course in OISE’s Central cohort, teacher candidates were introduced to a wide range of graphic texts, including comics, graphic novels, and picture books. The purpose was to demonstrate how these popular works are significant in encouraging many readers to engage with texts. Attention was given to how verbal and visual texts work together to help readers make meaning. Teacher candidates were also introduced to several response strategies to enrich comprehension. The language arts course work also included an opportunity for teacher candidates to plan and develop lessons using graphic texts and to gather data for consideration when using such texts for guided, shared, or independent reading. As a result of this project, teacher candidates were excited to teach with graphic texts, which they found were an engaging medium to support literacy instruction. They also found that the texts they used and the strategies they introduced—whether working with individuals, small groups, or the whole class—motivated students to read, write, and talk. Another beneficial outcome was that the ELLs were able to communicate their thoughts in response to verbal and written texts.
**Project Focus**

- How can comics and graphic texts extend the vocabulary growth and language development of English Language Learners (ELLs)?
- How might teachers be encouraged to use comics and graphic texts in their programs to engage at-risk readers, reluctant readers, and also proficient readers?
- How can this research inquiry project help teacher candidates to become reflective about best practices and differentiated instruction as they plan lessons to implement curriculum expectations in language arts?

*By incorporating the graphic novel into school literacy programs, educators will be recognizing students’ reading choices outside school and completing them with the texts mandated inside school.* —David Booth and Kathleen Gould Lundy, *In Graphic Detail*

*Many everyday classroom activities and assignments can be adapted—and enriched—by allowing students to approach them using more than one language. Inviting students to use their first language as well as English enables them to draw on their strengths, including their existing academic, linguistic and cultural knowledge.*

—Ontario Ministry of Education, *Many Roots, Many Voices*

In a world full of visuals from television, DVDs, video games, and computers, it is not surprising that young people today enjoy reading books presented in a comic book format. The graphic novel offers an alternative to the traditional texts used in schools, and it is a new medium to promote literacy development. Multimodal texts, such as comics, magazines, newspapers, the Internet, email, graphics, audio recordings and videos, are the media of “new literacies.” Together, these new kinds of texts fill the lives of students, and students discover meaning as they combine the messages from different media into their own construct of the world. In the past few years the world of education has experienced an explosion of interest in the use of graphic texts—also known as graphica—in the classroom. Recently, publishers of children’s literature have begun to produce graphica, making the genre more available to elementary students. Despite this, many language arts teachers seem reluctant and unsure of the suitability and function of the comic format in their instructional repertoire. A negative perception of this genre leads to a reluctance on the part of teachers to introduce graphic texts into the classroom; this attitude stems from misconceptions or misinformation about this popular text form. The purpose of this project was to both challenge and support the understanding that teachers have about the use of comics and graphic novels as instructional strategies for literacy development.

The effectiveness of graphic texts for creating proficient readers is directly related to the way that graphic novels are constructed. The pictures not only support the text but are also part of the text. The written words themselves are artistically placed and drawn to enhance the reader’s capability in making meaning. Readers, including ELLs, are therefore given context clues within the subtle, and sometimes not so subtle, expressions, symbols, and actions of the characters in the story. Vocabulary development is also supported by means of the illustrations and text.
Using comics in the educational framework of literacy development offers numerous occasions to address issues of comprehension, fluency, content-area learning, vocabulary development, and wide reading. The graphic novel format offers high-interest reading to many at-risk and reluctant readers, who usually shun traditional texts, as well as to proficient readers, who search for an engaging genre. Graphic texts are particularly helpful for ELLs. The visual messages placed alongside the minimal printed text remove some of the blocks that frustrate struggling readers who are attempting to comprehend the text and process the story.

The intention of this project was to enable educators to see the potential of using graphica to enrich comprehension and to motivate readers to become engaged with an accessible art form.

**Stages of the Project**

**Introducing the topic of graphic text use in the classrooms**

Elementary teacher candidates at OISE were introduced to current research and professional texts that support the use of comics and graphic novels in the classroom. A first semester introductory session provided teacher candidates with the history and background of graphica, visual and verbal formats that distinguish graphic texts, and a small library of graphic literature, including comic stories, picture books, novels, and non-fiction texts. An elementary associate teacher from York District School Board, who had already created a study unit that focused on graphic texts, presented a workshop in which she provided teacher candidates with sample graphic work that had been created by her students. A second semester workshop provided model lessons on how graphic texts can be used to teach comprehension. A demonstration was given on teaching techniques, including Readers Theatre, improvisation, and the designing of graphic texts. Teacher candidates also received a handout outlining ten ways to use graphic texts and a bibliography of graphic picture books and novels.

**Pursuing inquiry projects**

As part of their course work in language arts, each of the teacher candidates in the Central cohort was required to embark on an inquiry project with graphic texts as the assigned topic. Teacher candidates were challenged to gather and analyze data and become involved with case studies of ELLs. As course instructor, I presented the rationale for using graphic texts to support ELLs and also outlined the stages of conducting research during the practicum. The teacher candidates gained an understanding of the policy, philosophy, and practice with ELLs through reading and discussing *Many Roots, Many Voices* (Ontario Ministry of Education, 2005). At this stage, each teacher candidate received a *Boldprint* anthology (Booth, 2007) that was appropriate for the grade level they would be teaching. Each of these books features a comic story, which could be a resource for use during the practicum. Several teacher candidates also purchased graphic texts; the most popular was *The Arrival*, a wordless picture book by Shaun Tan (2007), and *The Invention of Hugo Cabaret* by Brian Selznick (2007).

**Implementation in the classrooms**

During the second practicum, teacher candidates worked with ELLs from junior kindergarten through to grade six. Each teacher candidate planned at least one lesson using a graphic text, appropriate for the grade level, as a resource. Some chose to focus on a lesson that involved working one-on-one with ELLs. Others provided lessons to the whole class and observed the ELLs and their
work. Teacher candidates conducted their inquiry projects by gathering data such as transcripts of conversations with students, graphic texts made by students, artwork, writing samples, or anecdotal observations.

Three projects serve as examples of what took place in the different classrooms. In a grade five classroom in an inner city school, one teacher candidate developed activities that integrated language arts and visual arts with a social studies strand on ancient civilizations. Her students read a number of myths and were asked to retell the story in a graphic story format. She provided literature models as well as a demonstration of the features of graphic texts to help the students complete their projects.

A second teacher candidate, working one-on-one with ELLs in a kindergarten setting, provided several pictures she had drawn and invited each child to arrange the pictures in an order and tell a story by using the illustrations as sources. She tape-recorded and transcribed the children’s conversations, and then she reflected on their use of vocabulary, their communication skills, and their ability to invent a story.

A third teacher candidate, in a grade six classroom, used the Internet and introduced students to a software program called Comic Life. She developed a unit for students to work in groups and go through the process of producing a graphic text. The students planned and developed stories, took digital photographs, and worked with the computer program to create their own Comic Life publications. The ELLs were part of the group, and the teacher candidate observed and assessed their participation as they solved problems and helped their friends complete the project.

**Sharing the Findings**

Teacher candidates reflected on their experiences and completed a written report of their inquiry project, which included an introduction and sections on methodology, data collection and analysis, and implications. Two key questions framed the final reflections: What did you learn about using graphic texts? What did you learn about English Language Learners as they engaged with the text and communicated their ideas in response to the text? In the final session of the project, teacher candidates shared their findings. First they each discussed their inquiry project with a partner and then they participated in a small group, describing their inquiry and presenting their data and findings.

**Data Collection and Analysis**

The data for the Going Graphic project included teacher candidate case studies, lesson plans, and their reflections on implications for future teaching. As well as using such methods as observation, transcripts of conversations, and written and art work by the students, several teacher candidates carried out a survey or an interview to learn about students’ reactions to reading graphic texts. To determine the impact of the instruction on literacy growth, teacher candidates considered students’ ability to (a) communicate ideas orally, (b) retell and tell stories, (c) use vocabulary specific to the text, (d) interpret visual cues, (e) engage with graphic texts over a period of time, and (f) follow instructions.

The teacher candidates gathered and analyzed data concerning the use of graphic novels in the primary or junior program. This activity provided a significant context for them to understand how graphic texts can help readers make meaning. In partnership with their associate teachers, the teacher candidates focused on the literacy development of ELLs. They considered resources and strategies
that combine pictures and words to help ELLs develop new vocabulary, practise language skills, and understand how stories work.

From the data collectively gathered and presented by the teacher candidates, it was evident that ELLs successfully used verbal and visual texts to make meaning. The illustrations provided significant cues to help students use their prior knowledge and experience to talk about the text. The sources introduced by the teacher candidates helped ELLs to identify main ideas, use vocabulary appropriate to the text, and raise questions about the text. Oral and written response activities invited students to communicate ideas and reveal their comprehension.

One of the central themes that the teacher candidates considered was motivation. Both primary and junior learners were very engaged with the content and format of the graphic literature offered to them. They willingly spent a period of time with the text, often revisiting the words and pictures. Following the activities that the teacher candidates introduced, many students returned to the literature to read independently, and many chose to read other graphic texts independently.

Impact
As project coordinator and initial teacher education instructor at OISE, I gained an opportunity to pay close attention to programming as it relates to literacy learning and ELLs. As I gathered resources and contemplated meaningful literacy instruction for engaging readers and enriching their comprehension, I gained valuable classroom experience and data to share with the Central cohort community, OISE colleagues, and other associate teachers. The goals of the project and its content helped me provide support to the teacher candidates on their journeys as teachers and researchers. Following are several key impacts that resulted from the experiences of the participants in this project.

Teacher candidates in the Central cohort
This project helped teacher candidates embark on an inquiry project that was a component of their Teacher Education Seminar (TES). Through discussions with their associate teachers, cohort colleagues, and course instructors, the teacher candidates had opportunities to consider how ELLs can develop comprehension, vocabulary, and communication skills by using strategies that can help these students respond to comics and graphic novels. Because the teacher candidates were well prepared with resources and strategies to use in their practica, they were empowered to use graphic texts in their teachings.

The majority of the teacher candidates agreed that they had a new understanding of the graphic text format. Their work with ELLs also helped them understand that to enhance comprehension it is important for these students to have visuals to accompany verbal texts. Nearly every teacher candidate described the success they had experienced with this project and their intention to use graphic texts in their future teaching. Following are comments by four of the teacher candidates:

I felt that this inquiry brought me closer to the learning profiles of individual students. I learned more about the specific nature of their difficulties with language, but I also saw what strengths and abilities they had and how graphic texts helped me to tap into their knowledge and skills.
Before conducting this inquiry, I was hesitant to use graphic novels in the classroom. Upon completion my opinion has completely turned around. The visual images in graphic novels transcend language and serve as a powerful tool for scaffolding vocabulary growth and meaning making. Having graphic texts in the classroom is an easy way to make reading more accessible to ELL students, as they are often familiar with the format in their own language and can use illustrations to infer meaning.

Thank you for introducing me to graphic texts. I never thought that this was something I would be interested in and I can’t wait to do more graphic “stuff” in the future.

I believe that if graphic texts or graphic novels are that motivational, then every teacher should use them. Excited and motivated students learn more and remember more and who doesn’t want a class full of excited and motivated learners?

**Associate teachers**

This project addressed OISE’s Initial Teacher Education program principle of strengthening school/university partnerships, since it directly linked the initiatives of the program with teaching practices in the schools. Teacher candidates and their associate teachers built a partnership as they developed lessons and reflected on their learning. The project strengthened the collaboration between teacher candidates and OISE’s associate teachers, who learned about a variety of resources and strategies that they could use to build their repertoire of literacy instruction. For example, when teacher candidates demonstrated in the classrooms the potential for engaging students, many associate teachers, for whom graphic texts were a new kind of resource, realized they could also use comics and graphic novels in their future programming. Even for teachers who were unfamiliar with (or reluctant to use) graphic texts for literacy development, the project seemed to provide evidence that successful reading, writing, and talk can be promoted by using such texts, especially because they appeal to the diverse needs and abilities of their students.

An associate teacher in a grade one class commented on how well the graphic-style picture books used by her teacher candidate helped her children “read illustrations and words together: The children were really excited about getting their hands on these books.” A junior teacher in another class was impressed with the quality of the students’ work when they prepared their own comic stories, and he told his teacher candidate that, as a consequence, he hoped to do a more in-depth study on the use of graphic novels in his program. In another class, where students worked collaboratively to create their own graphic version of a novel, and each produced one comic strip page for the class publication, the associate teacher said, “I think this is the first time the students really looked carefully at the author’s words. Because they had to use the dialogue from the novel for their own comic strips, they really thought carefully about what the characters said.”

**Students in the classrooms, kindergarten through grade six**

Developing the habit of reading is an important catalyst for improving literacy. By exposing young learners to texts that appeal to their interests and tastes, educators can help them develop a habit of reading. The popularity of graphic novels in itself facilitates this process. Ultimately, the project benefited the children in the classrooms by motivating them to read and respond to comics, graphic novels, and non-fiction texts. Through activities that involved discussion, questioning, reading aloud,
and writing, the students used strategies for reading growth and gained a greater understanding of the English language.

**Broader educational context**
The project supported the goal of the Literacy and Numeracy Secretariat to ensure that by the age of 12 all students attain a high level of literacy, numeracy, and comprehension. The process used in the Going Graphic project encouraged teachers to develop a model of inquiry that can inform their practice. The research process, including data collection and analysis, can strengthen educators’ literacy practice for the twenty-first century.

**Implications for Teacher Education**
All the teacher candidates responded enthusiastically to this inquiry project. Their written reflections described how excited they were about using graphica, how impressed they were with the engagement of the students in the learning activities that they had introduced, and how the research gave them a meaningful context for considering the strengths and challenges of working with ELLs. Not only did this project provide a context for teacher candidates to conduct research as part of the Elementary Language Arts program in the Central cohort, it also allowed them to address differentiated instruction that promotes success for a wide range of learners, including ELLs. This research helped build collaborative school/university partnerships because it linked the initiatives of OISE’s Initial Teacher Education program directly with teaching practice in the schools, and teacher candidates and associate teachers worked together to develop lessons that involved reading, writing, and talk. The nature of the project promoted the mentoring of teacher candidates by associate teachers through demonstration and modelling. Associate teachers also learned new instructional strategies. The professional development and dialogue that emerged from this project helped associate teachers and teacher candidates reflect on their practice and take specific actions to enrich their programs.

**Challenges encountered**
Although the project met its core goals, there were some challenges in the process both for the project coordinator and for the teacher candidates. When the topic of graphic novels was introduced to teacher candidates, the goals needed to be more clearly outlined. Even though comics and graphic novels are not a new cultural phenomenon, the teacher candidates had difficulty understanding and accepting the rationale for using graphic texts in the instructional program. Also, when teacher candidates embarked on their inquiry projects, they needed to be well prepared for gathering resources and learning strategies for using these resources. As instructor, it was challenging for me not only to present this information in a way that would help them understand the purpose and the process but also to demonstrate activities that teacher candidates could implement or adapt.

For the teacher candidates, there was an added demand to conduct their investigations within the short time period of the practicum. Some were able to extend the duration of the lessons. Others chose to isolate the ELLs and conduct the inquiry one-on-one. Integrating the lessons, sustaining the work of graphic text unit over a period of time, and balancing other expectations for teaching during the practicum remain a challenge, particularly when a focused inquiry project such as this one is mandated. Another issue was the fact that, although teacher candidates were free to choose resources, develop strategies, and gather data, the research project, as an assignment, did not give the
teacher candidates choice in the overall topic. In this respect, this inquiry project had both positive and limiting implications.

Practical Applications
The following classroom activities and events can be used to promote student learning with graphic texts:

- Students can prepare a Readers Theatre presentation based on a graphic text. Roles can be assigned for each of the characters that appear in the story. One or more readers can take the narrator role.
- Students can create their own graphic texts, transforming a picture book or novel into a comic strip. Provide the students with a template with four to six panels. Students can use the dialogue from the story to create dialogue balloons. It is not necessary for students to retell the whole story.
- Comic strip panels can be cut up, and students can work alone or with a partner to arrange the panels in sequential order. To begin, students might use a simple four-panel comic. Longer comic stories can also be used for this activity.
- Students can dramatize a graphic story. In groups, students can create still images using their bodies to represent parts of a graphic story. As an extension, students can create an improvised scene by role-playing the characters featured in the graphic text.
- A page of graphic text can be used for a shared reading lesson. Students can identify the different speech bubbles, the use of narration, the perspective of the illustrations, etc. Students can discuss how effective the illustrations are in giving information. Does the verbal text give as much information as the visual images? What scenes might be added to the graphic text?
- After students have read a graphic story independently, invite them to retell the story in their own words. Notice how successful they are at discussing plot, character, setting, or conflict.

Next Steps
This project provided opportunity for a group of educators to consider issues related to supporting ELLs, and it confirmed the need to implement a variety of strategies to build communication and comprehension skills. Since the use of graphic texts proved to successfully engage these students, a number of questions have emerged: How can a range of graphic resources be included throughout the curriculum to boost literacy among ELLs? How can verbal and written graphic texts be better deconstructed so as to enrich reading comprehension strategies for all students, including ELLs who are at-risk students and others who are proficient readers?

The topic of graphic texts will be included in future language arts classes at OISE. Samples of graphic texts, data collection and analysis, and reflections of the teacher candidates will be presented to other language arts instructors and in workshops throughout Ontario. The results of this project have been presented at the International Reading Association conference in 2008, and will be presented again at the 2009 conference to be held in Minneapolis, Minnesota. Additional opportunities for presentation
in Ontario include the “Reading for the Love of It” conference in February 2009 and the Council of Drama Educators conference in October 2009. Ultimately, evidence of the application of this inquiry will be found in future classrooms of the teacher candidates.

As a result of one inquiry project in which a teacher candidate helped students transform a text into graphic format and create a class graphic novel, a film called Going Graphic was produced, and this will be screened at future language arts conferences and professional development sessions. Three other teacher candidates plan to prepare an article for publication outlining the procedures they used and the learning that resulted from their inquiry projects, which used the Comic Life computer programming to help special education students design their own graphic texts.

For those who choose to use graphic novels in their programs, or invite students to create their own graphic texts, or observe and assess the students’ comprehension in their response to graphic texts, this project will have made a positive contribution. Whenever these teacher candidates or associate teachers invite ELLs to read graphic texts and communicate their thinking through talk, writing, or the arts, they will have spread the seeds of Going Graphic.

Acknowledgements
I wish to extend sincere thanks to the teacher candidates and associate teachers who participated in this inquiry project. I would like to acknowledge Brian Okamoto and his students for a close-up study of graphic texts at Queen Victoria Public School, Toronto District School Board. Thanks also goes to Kimberly Pollishuke, teacher at Carrville Mills Public School, York Region District School Board, for sharing the work of her students with OISE’s teacher candidates.

References

Larry Swartz is the co-coordinator of the Central cohort, Elementary Teacher Education Program, OISE and the principal of Dramatic Arts, Continuing Education, OISE. Larry Swartz’s interest in children’s literature has provide him many hours of leisure reading which has helped shape his teaching repertoire. He is interested in research that involves the talk curriculum as well as arts-based learning.
THINK-ALOUDS: A TOOL FOR UNDERSTANDING ELEMENTARY STUDENTS’ COGNITIVE STRATEGIES IN LITERACY AND NUMERACY TASKS

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Project Partners
- Teachers in OISE’s Institute of Child Study (ICS) Laboratory School
- OISE graduate student researchers: Saad Chahine, Christian Chun, Nenad Radakovic, Andrew Shaw, and Ruth Beatty
- Teacher candidates in the two-year MA program at OISE

Abstract
In collaboration with teachers at OISE’s Institute of Child Study (ICS) Laboratory School, the research team recruited 38 students, from grades three to six, who represented a range of academic proficiency. They implemented think-aloud protocols to provide data on what students think and how they approach cognitive tasks in literacy and mathematics. Educators increasingly use think-aloud protocols as a data-gathering tool for understanding the complex nature of students’ cognitive processes and strategies. In addition, think-alouds are a highly effective instructional and learning tool. During this project the research team collaborated with teachers at ICS to carry out 38 think-aloud sessions, which use literacy and math tasks that can inform
teachers about students’ cognition. The study identified a wide range of cognitive strategies that differ significantly in relation to students’ socio-cultural backgrounds and grade levels. It also provided insight into students’ attitudes, values, and perspectives that shape their learning experiences in literacy and numeracy. The study provided a systematic knowledge base for teachers, teacher educators, and teacher candidates to understand students’ cognitive strategy use and to develop various instructional strategies that can be very effective for improving students’ abilities and enriching their learning experiences.

**Project Focus**

The purpose of the study was twofold:

- To contribute to the systematic knowledge base about the cognitive processes and problem-solving strategies that elementary school students utilize while solving literacy and numeracy tasks
- To increase teachers’ knowledge about students’ cognition of learning and guide their instructional practice

Both textual comprehension and mathematical problem-solving processes involve complex cognitive activities. Skilful learners constantly draw on background knowledge as they process text and comprehend problems, visualize the events in the text, recognize the structure of the text, and predict the content of the text by looking at titles and pictures. They create mental pictures to synthesize new information from the text and constantly monitor their strategy use. Effective learning involves orchestrating multiple skills from low- to high-level thinking processes and developing the ability to evaluate the benefits of using a particular strategy, as well as when and how to use a strategy with reference to one’s own learning goals (Baker & Brown, 1984; Collins, 1991; Johnson & Afflerbach, 1985; Stanovich, 1986).

Increasingly, think-aloud protocols have been used as a data-gathering tool for understanding the complex nature of cognitive processes and strategies that students use. By prompting students to think aloud as they work through problems, teachers and researchers can indirectly observe the cognitive processes and strategies students use to carry out the tasks (Cohen & Upton, 2007; Ericsson & Simon, 1993; Green, 1998).

Verbalization can take place either concurrently or retrospectively. Think-alouds represent the standard approach to concurrent verbalization, that is, asking a student to think aloud his or her thoughts while performing a task. In doing so, students are not expected to describe or explain what they are doing but are asked to simply verbalize the information that they attend to while solving the given task. The other approach, retrospective verbalization, involves asking students to recall their thoughts by using some retrieval cues after the task is completed, and then to provide a verbal report. Teachers can use video clips, pictures, or students’ sample work to facilitate the process of recall.
Think-alouds can elicit strategies that are not easily observed. For example, students can be asked to verbalize their thoughts as they engage in a problem-solving activity. Based on students’ verbal accounts, researchers and teachers can infer not only cognitive but also metacognitive and socio-affective strategies (O’Malley & Chamot, 1990). Cognitive strategies concern conscious and purposeful efforts to solve a problem or complete a task by “transforming learning materials” (p. 8). Typical cognitive strategies include classifying, inferencing, summarizing, deducing meanings, using imagery, transferring known information to a new learning task, and elaborating. Most social and affective strategies involve collaborative learning through interaction with others. Examples of social and affective strategies include cooperation with peers, questioning for clarification, and self-talk. Metacognitive strategies involve various mental activities that function to manage a learning process, plan learning, monitor comprehension and production, and evaluate efficacy of strategy use.

Research shows that students who can verbalize their thoughts and describe strategies score significantly higher on cognitive tasks (Jang, 2005). Thus, think-alouds require a high level of metacognitive ability (i.e., the ability to think of one’s own thinking) and some training. Teachers can use think-aloud lessons to provide learning opportunities for students who are yet unfamiliar with think-alouds and who are not metacognitively proficient. To do so, teachers need to design think-aloud lessons based on what they want to learn about the strategies that students use and the effectiveness of these strategies.

The teacher can help students who are not metacognitively proficient by modelling think-alouds. Those students benefit greatly from observing what more proficient students, and the teacher as well, think about while engaged in a learning task. The students observe how the teacher processes a text, comprehends a task, constructs meaning of unfamiliar vocabulary, recognizes the organization of the text, attempts different strategies, and evaluates the effectiveness of strategy use. Teachers need to know the common mistakes and strategies their students use; then they can model various approaches and strategies that the students may use, given their current proficiency levels. The teacher’s modelling should not be too advanced for students who are just developing new skills. Carefully designed think-alouds enable the teacher to use scaffolding strategies successfully.

Much is still unknown about the cognitive processes and problem-solving strategies that elementary school students use in literacy and numeracy. A goal of this project was to generate data-based accounts of what students think and how they approach their learning while engaged in cognitive tasks in literacy and mathematics. The collaborative dimension of this project occurred when teachers and researchers were brought together to share literacy and numeracy practices in order to inform one another and develop a deeper understanding of students’ cognitive processes and use of strategies.

**Stages of the Project**

**Reviewing the curricular expectations and sample tasks**

The first phase of this multi-year project began during the 2006/2007 school year. During this phase, I worked with two panels of literacy and numeracy teachers to analyze the curricular framework and identify the primary literacy and numeracy skills embedded within it. To examine how certain tasks elicit the primary skills that students are expected to acquire, the panel analyzed the cognitive characteristics of the literacy and numeracy tasks included in the grades three and six EQAO tests.
Twenty cognitively rich tasks that require higher-order thinking skills and multiple strategies were identified.

**Collaborative research design**

During the design and implementation of this project, the project coordinator and three volunteer graduate student researchers collaborated as a research team. Two graduate assistants helped with tasks related to transcription and data analysis. The research team met with associate teachers and administrators at OISE’s ICS to share the purpose of the project and discuss the research procedures. The teachers’ input was invaluable in refining the details of the study plan. For example, the teachers showed strong interest in whether and how students at different levels of proficiency would approach tasks differently. The research team integrated this idea, by asking three associate teachers to assess the general proficiency levels of students who agreed to participate in the study, and then used the teachers’ input as part of the student selection criteria.

**Students’ think-aloud verbal protocols**

Each of the 38 students from grades three to six who participated in the study was interviewed. The eight graduate student researchers, including two MA teacher candidates who had completed their practicum at ICS, one instructor in OISE’s Initial Teacher Education program, and five OISE graduate students, conducted the interviews. The students verbalized cognitive skills and problem-solving strategies while they worked through a series of literacy and numeracy tasks, ten for literacy and ten for numeracy.

Following are two excerpts from transcripts that illustrate the think-aloud process. In the first, a grade four female student, Kathy, reads a portion of text (blue) and verbalizes her thoughts concurrently (blue italicized).

**Kathy:** It looks like kitchen magic. You take a handful of dried corn kernels, small and hard as ladybugs. Throw them into a hot pan with a little oil, and soon they’re jumping, spinning and exploding into shapes like freeze-dried clouds.

*So I might feel excited if this if I’m making popcorn and they keep popping and then they might pop everywhere so I might be excited to eat them after they’re done.*

*So it sounds interesting to me since I’m learning all this while I’m reading all this so I kind of want to read even more about this. It gets me interested in all this.*

In the second excerpt, a grade five female student, Emma, verbalizes her thoughts while solving the following math problem.
Question: Germaine buys one hamburger, one sandwich, and two fruit salads. How much change should she receive from $20.00?

Answer: (a) $9.15, (b) $9.45, (c) $10.55, or (d) $12.15

Emma: Germaine buys one hamburger, one sandwich and two fruit salads, how much change should she receive from twenty dollars?

So, a hamburger is three fifty and sandwich is two seventy-five and two fruit salads, well, the hamburger is three fifty and then the sandwich is two seventy-five so if you add those zero plus five, that’s twelve, three plus two plus one is six, so, so far that’s six dollars and twenty-five cents. Two fruit salads, one dollar sixty, a dollar sixty plus a dollar sixty, six plus six is twelve and then when you add the zero it’s one hundred and twenty cents so basically with the two of them it would be two dollars and twenty cents, two plus two twenty um five, two plus two is four, um, six seven eight, so, um, twenty dollar bill, twenty, so [mumbling] minus this [more mumbling about subtracting from twenty but I can’t make it out] five minus ten, so it’s five there, um, four minus nine is five, nine minus eight that’s one and so that, so, wait so, oh…

Interviewer: What are you thinking now?

Emma: I’m thinking if I can take away that money from the twenty dollars, you know?

Interviewer: Which money?

Emma: Like the money of how much things cost all together without, you know, how much she needs back, um, so then you can’t take those numbers from zero, so ok so the five goes there, and then so then that’s five so ok then eight minus, wait, so then, nine minus eight, twenty becomes nineteen so nineteen minus eight, nineteen minus eight. So nineteen minus eight, um, so nineteen minus eight minus nine would be ten, so minus eight would be eleven, so then that would change, ok that doesn’t work, that’s not one of the things there. Um, let’s see maybe wait, cause ok, I’m just going to double check that this is ok, so the hamburger plus the sandwich, so ok, it’s twelve, add the three to the one, six, and then the two fruit salads one sixty plus one sixty, zero, zero there, six plus six is twelve plus three so that would be, oh, that’s where I made a mistake, ok, that’s where I made my mistake, so then three twenty for the two fruit salads two plus two is four, six plus three is nine, so it’s nine dollars and forty-five cents so twenty dollars minus nine dollars and forty-five cents let’s see, um, so, nineteen there, nine there, five there, five there and nine minus nineteen is ten dollars, so there’s ten dollars and fifty-five cents.

Data Collection and Analysis

The primary method of data collection was the use of think-aloud verbal protocols to bring out learners’ cognitive processes and problem-solving strategies (Ericsson & Simon, 1993; Gass & Mackey, 2000; Jang, 2005; Leighton & Gierl, 2007). The data included the tape-recorded content of interviews.
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with the 38 students, each session lasting approximately 30 to 45 minutes. Data from the students’ verbal accounts were analyzed by focusing on differences in cognitive skills and problem-solving strategies among students of different grades and different proficiency levels. Students’ cognitive processes and strategies were classified using a coding system that the literacy and numeracy panel had developed in the first stage of the project. Preliminary findings of the study offered insight into the complex nature of cognitive processes underlying literacy and math tasks.

The students’ verbal accounts illuminated a wide range of strategies that differed substantially among the students. Two themes illustrate the complex nature of students’ cognitive processes and their approaches to literacy and numeracy tasks: (1) role of background knowledge in literacy and numeracy, and (2) literacy as a mirror of identities.

Role of background knowledge in literacy and numeracy

The data from the students’ verbal accounts reveal numerous instances in which students used their background knowledge to process textual information for reading comprehension and to solve math problems. In a schematic view of cognition, background knowledge is classified into formal schemata, which are associated with knowledge about text genres and rhetorical organization of the text, and content schemata, which are associated with knowledge of the context and content of the text problem. (Carrell, 1988; Nassaji, 2007). Students’ access to the resources within their background knowledge depends on both their prior experience and their socio-cultural background. For example, the verbal account of a grade three female student, Susan, indicates that she had been socialized differently than the other three students in the same grade. Her familiarity with and knowledge about the genre of the text is clearly reflected in her response to the interviewer’s question, what type of reading is this? Her response, “short story,” indicates that her expectations of the genre’s conventions are clear: “Because they don’t have to do very long stories … I expect a lot of detail in the [author’s] writing.” She shows a high degree of meta-awareness of textual styles and conventions through her demonstrated knowledge: “It was more about how the story was put in, like … the display of it.” Her phrases, “how the story was put in” and “the display of it,” are indicative of her access to formal schemata in the process of textual information.

The students’ attempts to contextualize problems using their prior experience are also found in their verbal accounts from math tasks. For example, the students were asked to solve the following math problem:

A rectangular wall is being built. The chart shows the dimensions of the wall after each day. If the pattern continues, what will the perimeter of the wall be at the end of day 10?

<table>
<thead>
<tr>
<th>Day</th>
<th>Height</th>
<th>Length</th>
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<tr>
<td>1</td>
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</table>

Most of the students, regardless of their general proficiency level, imagined the wall in three dimensions and could not solve the problem using the standard perimeter formula because they thought they needed more information about the third dimension (i.e., the width). In fact, the students’ visualization of the context, by using the imagery of a wall, distracted them from solving the problem. Interestingly, one female student solved the problem correctly by building the “wall” using...
her pencils. She reported that the third dimension was not important because it would be relatively small compared to the other dimensions.

This example indicates that students create mental imagery and turn the problem into concrete experience as they work with problems. However, these mental activities are not necessarily successful all the time. Students’ background knowledge may be incomplete because of limited real-life experiences; therefore, inconsistent effects are demonstrated in the results of using schemata on cognitive tasks. In such cases, teachers’ scaffolding strategies, including modelling with think-aloud or using graphic organizers, are desirable for developing students’ ability to use schemata effectively.

**Literacy as a mirror of identities**

The analysis of the verbal accounts vividly revealed how literacy serves as a mirror in which students’ self-identities are reflected. Students are capable, to different degrees, of constructing their specific identities as literacy agents; this happens in ways that suggest their probable success in the context of specific literacy practices—particularly those recognized and valued in mainstream schools in North America. The understanding of differences among students, in terms of their attitudes, perspectives, and ways of interacting with the same text, appears to be the key to understanding why and how students’ cognitive processes and strategies differ from each other.

For example, two grade four students demonstrate strikingly different attitudes and identities toward literacy practice. One student, Susan, actively positions herself as the writing agent in charge, showing confidence in her abilities to read and write. When asked to think of what might happen to Tom after he missed a school bus on the rainy morning, she does not merely guess what might happen to Tom next, she puts herself in control of the narrative by saying, “I would like to think about maybe three different things I could write that would fit in there.” Her use of the first person singular pronoun and its role in her agency is apparent, and her grasp of the narrative conventions is clear in her assertion that she could think of several scenarios that “would fit in there.” In contrast, another student, Kate, constructs a passive identity subject position, waiting for events to happen to her, and letting those events shape and influence her emotions: “I kind of felt that way,” “I keep hoping,” and “if something good happens to me I’ll be really happy.” This clearly stands in contrast to Susan’s more assertive positioning of her agency in writing. The observed difference between Susan and Kate offers an important insight into understanding how students construct their literacy identities differently, which in turn deepens the understanding of how and why students approach cognitive tasks differently. This finding supports the contemporary thought that learning takes place through the interaction of an individual’s mind with physical, social, and cultural contexts (Greeno, Collins, & Resnick, 1996).

**Implications for Teacher Education**

The findings of this project, briefly described in this article, contribute to an enriched understanding of the ways that elementary school students engage with literacy and numeracy tasks. The students’ verbal accounts provided the researchers with a means to observe the students’ thought processes and various problem-solving strategies. As a result, this project shows that the students’ approaches to cognitive tasks are greatly influenced by their prior experiences, attitudes, and perspectives about themselves in relation to others. Also, by providing a basis for teachers, teacher educators, and teacher
candidates to understand students’ cognition and value systems, this project has implications for teacher education. It provides rich data and concrete cases for teacher candidates who desire to better understand how cognition works and why students approach literacy and numeracy tasks differently.

Practical Applications

This project offers practical guides for developing effective instructional strategies that can improve students’ abilities and enrich their learning experience. Think-alouds enable teachers to closely observe how students make sense of new information and how they relate it to their own experiences both inside and outside school. In urban schools, the quality and range of student experiences also vary significantly across different linguistic, socio-economic, and cultural backgrounds. Responsive teachers will understand that learning is a complex journey and that cognition along this journey shapes, and is shaped by, students’ values and socio-emotional dispositions. Teachers need to design instruction and plan activities that allow students to bring their own experiences and interests to literacy and numeracy learning.

While think-alouds allow educators to access students’ cognition and thinking processes, they also demand a great deal of oral language proficiency and metacognitive skills. This has a significant implication for English Language Learning students whose English proficiency has not yet fully developed. Thoughtful teachers recognize that students have different ways of representing their thoughts and feelings, and thereby will encourage their students to think aloud and reflect on learning, using the language with which they feel most confident and comfortable.

As a useful research tool for teachers, think-alouds provide a sound knowledge base on how students learn and think. Information acquired through continual and careful observation can be used to fine-tune instruction to individual students’ needs and to assess students’ growth. Teachers can apply ongoing inquiry in their teaching practice by generating their own data and making conscious instructional decisions in light of the data.

Think-alouds are not intended to model a “correct” way of thinking but are used to understand how students think and approach their learning tasks. They also help students to be strategic, reflexive, and engaged in their learning.

Since trial and error is part of learning, teachers can encourage students to take risks with their thinking, instead of simply asking them to explain their answers to literacy and numeracy problems. With this approach, teachers may model students’ unique thinking processes—instead of using their own correct process—in order to help students evaluate their thinking critically.

Next Steps

The research team will continue to analyze the remaining data, and we anticipate offering a research retreat to ICS teachers and teacher candidates at OISE. We plan to work with both groups of teachers to develop and evaluate effective instructional approaches that will encourage students to assume greater control of their own learning in literacy and numeracy. The research team will work together
to integrate this knowledge base regarding think aloud protocols into a larger, ongoing study that is examining the developmental trajectories of elementary school students’ acquisition of literacy and numeracy skills.

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**References**


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Abstract

Technology is revolutionizing much of the way the world operates. A 1998 survey found that students, teachers, and parents agree on technology’s potential to make substantial improvements in education; however, technology has not been fully integrated into the learning process (Schroeder, 1999). The purpose of this project was to support associate teachers and teacher candidates in their effective use of technology and to examine the factors that can lead to their use of technology to optimize literacy and numeracy learning in the classroom. Ten associate teachers volunteered to demonstrate their use of various technologies during literacy or numeracy lessons. They invited teacher candidates to observe them introducing a new piece of technology to their students in junior kindergarten and the elementary school grades. As a result of this project, teacher
candidates were able to observe and discover new ways of introducing and integrating technology into their daily instruction and assessment. The integration of Smart Board technology improved student engagement and the cooperative, online, Moodle discussion allowed students to reflect more deeply on a novel they were studying and its connections to their lives.

**Project Focus**

- How can associate teachers and teacher candidates be encouraged to use technology such as blogs, podcasts, online conferencing (Moodles), and Smart technology to support the attainment of literacy and numeracy goals with students?
- How can teacher candidates become engaged in demonstration lessons in which a new technological tool is being introduced to students?

The integration of technology in the classroom has powerful effects on student learning. According to CEO Forum (2001), “technology can have the greatest impact when integrated into the curriculum to achieve clear, measurable educational objectives.” As well, Cradler and Cradler (1999) show that the integration of technology in the classroom increased student knowledge in research skills, ability to apply learning to real-world situations, organizational skills, and interest in the content.

One goal of this project was to have associate teachers and teacher candidates understand the potential of using blogs, podcasts, online conferencing (Moodles), and Smart Board technology to support their classroom teaching of literacy and numeracy. Research studies show that during Smart Board lessons elementary students communicate and collaborate effectively, and with the use of technology in general, students’ attentiveness to lessons increases and classroom management difficulties decrease (Clemens, Moore, & Nelson, 2001; Brown, & Walford, 2008). A study conducted in Kansas by Clemens, Moore, and Nelson (2001) reported both positive attitudes and excellent student results related to the impact of Smart Board technology on instruction. In that study there were six girls and fourteen boys involved. All were identified as at-risk students, with socio-economic disadvantage, and with little to no access to technological tools in their homes. The researchers analyzed data obtained through surveys and questionnaires and found that, at the end of their study, “100% of the participants preferred using the Smart Board and other forms of technology as opposed to traditional paper and pencil methods of instruction” (Student Survey section).

Although many college students have grown up with computers as a normal part of their lives, many teacher candidates have not yet considered what an effective, technology-rich classroom looks like (Russell, Bebell, O’Dwyer, & O’Connor, 2003). Therefore, teacher candidates have an incomplete vision of how technology can enhance instruction. Although educators realize the value of using technology to enhance learning, the professional development of teachers lags behind available resources.

At the Secretary’s Conference on Educational Technology in Washington DC, Goldman, Cole, and Syer (1999) noted that applications such as spreadsheets, simulations, CAD systems, and multimedia software are often used for limited tasks such as word processing, but they are rarely used for
content learning. A report by the National Education Association on technology use in public schools (2008) found that most educators use technology regularly at school for administrative tasks, but few use it for instruction-related tasks.

Surveys have confirmed that many practising teachers believe they are ill prepared to integrate technology in their classroom instruction (Education Week, 1999). According to Scheffler and Logan (1999), fewer than 20 per cent of the teachers surveyed felt adequately prepared to integrate technology into the curriculum, even though they believed technology to be a valuable and important teaching tool. The issues surrounding the lack of professional awareness and preparedness for using technology continue to plague teachers and schools today.

In this project we moved away from a skills-based approach and towards an instructional and mentoring approach that helps teacher candidates incorporate technology seamlessly into curriculum and lesson planning.

The aim of this project was to provide opportunities for associate teachers and teacher candidates to become more informed about using technology in their classrooms to optimize literacy and numeracy learning. During the project there were 10 demonstration lessons in which a new technological tool was introduced to students; this was the specific context where this professional learning occurred.

Stages of the Project

Preparing for the demonstration lessons

The participants in this project were ten associate teachers and their teacher candidates from two school boards in the Greater Toronto Area. The teacher candidates were provided with the same opportunities as the associate teachers for professional development in the area of technology. The associate teachers also received 25 hours of professional development support to become effective mentors. All participants explored interactive whiteboards (Smart Boards), blogging, podcasting and online learning, as well as interactive software. Online support was established, and participants engaged in an online course using Moodle (an online discussion platform) and Knowledge Forum (an online course platform). In addition to support by OISE personnel, the York Region District School Board invited the participating associate teachers and teacher candidates to a full-day conference, “Using Technology to Enhance Learning.” The teachers were given class coverage during the conference and provided any follow up support they needed for using the technology in their classrooms. After the conference the associate teachers gathered to plan demonstration lessons using the technology about which they had just learned. They decided which technological tools to highlight for the teacher candidates and how to introduce the first lesson. The teacher candidates signed up for one or two demonstration lessons at different schools.

Demonstration lessons

The demonstration lessons occurred in junior kindergarten to grade eight classrooms in February 2008. The teacher candidates observed introductory lessons in the use of specific technology. There were two mathematics lessons using Smart Board and one lesson using Moodle in the area of literacy. Junior kindergarten students used the Smart Board to manipulate and discover patterns with
symbols and numbers. The students were able to easily identify repeating patterns and to create their own patterns on the Smart Board. In the grade five Moodle lesson, students discussed online discussion etiquette and collaboration. One grade eight teacher introduced teacher candidates to adaptive software called Kurzweil. Her students were able to use the software to read higher-level texts. Each teacher candidate recorded on an observation sheet any ideas and reflections that could help them in practice teaching, which was scheduled to occur in the following month.

Data Collection and Analysis
In this project three methods of data collection were used: reflective writing, surveys, and anecdotal observations during the demonstration lessons. Teacher candidates and associate teachers completed a written reflection immediately following the demonstration lesson. In addition, as observers in the classroom, the project coordinators made observation notes during three of the demonstration lessons. Two months after the demonstration lessons, associate teachers and teacher candidates completed a final survey about their beliefs around the use of technology as well as the value of the demonstration lessons. Sixty teacher candidates completed the final reflective survey in April 2008. Their responses included positive comments about the project, their experiences during the demonstration lessons, and their subsequent practice teaching. After all data were collected, the surveys, written reflections, and observation notes were examined and analyzed for patterns, themes, and any changes over time.

Impact
Impact of using technology as an instructional tool
Teacher candidates were enthralled with the demonstration lessons that used the Smart Board in mathematics and Moodle in a literacy class. They noted how engaged the students were during the lessons:

I love the Smart Board. The junior kindergarten class was completely engaged during the lesson on patterning, and all the students were able to replicate the patterns at their desks. I’m definitely going to use the Smart Board with my students during practicum!

I’m so glad I was able to observe how to introduce an online discussion forum through Moodle today. It was amazing how the grade five class was able to quickly come up with “rules” for “netiquette” as well as to provide guidance to one another on how to post a thoughtful book response.

The teacher candidates also noted questions related to classroom set-up, management of student behaviour, differentiated instruction, and trouble-shooting around technology difficulties; all their written reflections indicated that they were eager to improve their use of technology to enhance student learning:

Visiting the schools allowed me to see the actual implementation of different technology in everyday classrooms. It showed me how the technology works and how it affects the student learning. I found this experience very helpful in terms of using technology in my own future endeavours.
Mentoring to support the use of technology

Nine out of the ten associate teachers who completed the final survey indicated that peer or mentor support was important when learning something new. They all indicated that they felt empowered as teacher leaders during the demonstration lesson. Ninety per cent also agreed to have teacher candidates observe a demonstration lesson again in the future. However, one associate teacher felt very nervous during her demonstration lesson, and experienced some difficulties with the technology. She said that in future she would prefer to have two or three teacher candidates observe her lesson, instead of ten.

One eager associate teacher wrote on her survey,

The demonstration lesson was helpful for me and the teacher candidates. We always learn when teaching and/or modelling. I got great questions that made me think critically about my practice and student learning during the lesson. These demonstration lessons help the teacher learn too!

The associate teachers felt that they learned from the teacher candidates’ responses to their lessons and also from their own students’ responses to using the technology. One associate teacher found that she learned a great deal about online discussion etiquette from her students, and the teacher candidates told her how helpful the discussion was for them as well.

Need for further professional development in use of technology

As instructors in OISE’s Initial Teacher Education program, we want to inspire and support teacher candidates in their use of technology; until now, many of them receive less than three hours of instruction on technology use in the classroom. There have been similar findings in North American studies of teacher education programs. In 1999 Milken reported that 70 per cent of teacher education programs in the United States required students to take three or more credit hours of technology-focused courses. Although this was promising, a subsequent study of those same colleges by Milken in 2001 indicated that pre-service teachers, as well as their colleagues already in the classroom, are not adequately prepared to integrate technology into their teaching practices.

Is this situation the same in Canadian faculties of education? In 2005, OISE teacher candidates reported to their supervisors that Smart Boards were available in their practicum schools, but they didn’t know how to use them. They also reported that few associate teachers were showing them how to use Smart Board technology. Milken (2001) found that this problem was exacerbated by the fact that many colleges of education do not have technology-enhanced classrooms that would allow faculty to routinely model the use of the Internet and other technologies.

An important finding emerged from one of the last questions on this project’s final reflective survey: What suggestions do you have for improving the use of technology by teacher candidates in the future? Fifty-five out of the 60 respondents replied that they would like to see more modelling of the use of the Smart Board, Moodles, and blogging within their own classes at OISE. During the academic year faculty instructors used the Smart Board in three classes, but Moodles and blogging were not used. Fifty of the 60 teacher candidates recommended that the education faculty have Smart Boards in the classrooms on a daily basis so that teacher candidates could practise using them. Eight of the ten of the participating associate teachers indicated that they need more professional
development and support from their school boards in order to integrate technology into their classroom learning on a regular basis.

Implications for Teacher Education

The value of demonstration lessons

Teacher candidates often struggle to meaningfully integrate technology in their classrooms. We believe that teachers’ concern with this difficulty is due to the fact that they were introduced to software and hardware in isolation, with little connection to lessons, instruction, assessment, or curriculum. Research studies show that both in-service and pre-service technology training programs have focused on the computer software instead of on the curriculum, which leaves teachers unable to create or implement learning activities in ways that use technology successfully (Gilmore, 1995; Yildirim, 2000). These skills-based and software-based approaches can leave teachers without a vision of how technology can improve teaching and learning. Training that focuses on specific technologies or the mechanics of computer technology has little carry-over into classrooms (Beavers, 2001). In this project, the demonstration lessons provided an instructional and mentoring approach to help teacher candidates incorporate technology into curriculum and lesson planning.

The integration of technology occurs when the tools are presented in a context of meaningful, authentic, learning situations and where teachers can see practical applications, engage in a reflective teaching practice, and share their ideas with others (Spady, 1994; Warner, 1999). Learners want to see relevance in what they are learning. For pre-service teachers, relevance means not only how they are personally affected but also how methods and tools might affect the learning of their future students (Valdez et al., 1999; Rodriguez & McDonald, 2001). In this project associate teachers demonstrated to teacher candidates the meaningful integration of technology. Their lessons incorporated authentic learning in literacy and numeracy and also the use of technology as a powerful tool to support such learning and engagement on a daily basis.

Mentoring beginning teachers

An important part of the process of integrating technology in classroom teaching is the mentoring of teacher candidates as they learn about the technology and apply it to their planning and instruction. McCann, Johannessa, and Ricca (2005) believe that new teachers benefit from a broad network of contacts with peers and external resource people, as well as with former associate teachers. In our project, relationships that were initiated among teacher candidates and associate teachers both supported and helped establish a good foundation for future mentoring and collaborations.

Associate teachers play a pivotal role in the development of teacher candidates because new teachers require a great deal of support to be successful and to remain in the profession. By supporting that mentorship process, faculties of education can assist in the induction and retention of new teachers. The demonstration lessons allowed teacher candidates to support one another in their peer groupings, as well as to receive guidance from an experienced colleague in the use of technology to enhance learning. Their learning in the demonstration lessons was translated to their practice teaching. The teacher candidates included in their unit plans at least one lesson that incorporated a webquest, Smart Board, Moodle discussion, or podcast. Some teacher candidates provided a workshop at their practicum schools on how to use the technology in numeracy and literacy.
Practical Applications

Teachers can use technology in various ways in the classroom. The Smart Board can be used with kindergarten students in a mathematics class to classify shapes and colours. A grade six class can use Smart technology to identify, measure, and classify various angles. Moodle can be used in junior classrooms to do online reading responses in guided reading groups; students can respond to other students’ comments regarding a text as they focus on developing comprehension strategies. Using this format, the teacher can readily access students’ comments and observe the reflective quality of students’ responses.

Next Steps

It is clear that student engagement increases when technology is integrated effectively into the curriculum. The technology conference that participants attended in York Region District School Board and the subsequent demonstration lessons allowed both the teacher candidates and the associate teachers to collaborate and learn together so that they could successfully use technology in their classrooms. Both new and experienced teachers will benefit from continued professional learning and support for the integration of technology in the classroom. We have learned that it is critical that faculty instructors enhance their use of technology in their lessons and workshops with teacher candidates. This modelling by both faculty instructors and associate teachers will encourage teacher candidates to further develop their own learning and ability to use technology in their teaching. We plan to pursue the purchase of Smart Boards for the faculty classrooms as well as to continue providing a technology conference and follow-up demonstration lessons.

References


**Krista Walford** is a co-coordinator of the Doncrest cohort in the Elementary Teacher Education Program, OISE. Her research interests in the mentoring of new teachers and in teacher use of technology are part of her doctoral studies.

**Charmain Brown** is a co-coordinator of the Doncrest cohort in the Elementary Teacher Education Program, OISE. Charmain’s research interests include teacher education, induction, and mentoring.
PROFESSIONAL LEARNING THROUGH AN ONLINE LITERACY JOURNAL FOCUSED ON CLASSROOM-BASED RESEARCH

Shelley Stagg Peterson

Project Coordinator
- Shelley Stagg Peterson: Associate Professor in the Department of Curriculum, Teaching and Learning, OISE

Project Partners
- Meadowcrest Public School, Durham District School Board: Lena Glaes-Coutts, vice-principal
- Master of Teaching students: Sara Ann Francis and Erika Mcmeekin
- Graduate student: Hyeran Park

Abstract
This article describes the launch of the refereed online *Journal of Classroom Research in Literacy*, a publication that showcases classroom research in literacy that has been carried out by teachers and teacher candidates. Interviews were conducted with members of the editorial team and with writers and reviewers of the articles submitted for publication. The data were used to assess the efficacy of the journal launch process and to provide direction for enhancing professional growth of teachers and teacher candidates as they contribute their writing to the journal in the future. Participating teacher candidates and teachers grew professionally from the formal opportunities to reflect on their practice and to learn from the practice of colleagues. They were surprised that the writing and reviewing were not as onerous or time-consuming as they had anticipated, but recommended that the deadlines for submissions be moved to the end of the calendar year. This would allow teacher candidates more time after completing their BEd to write articles based on action research they had conducted during the initial teacher education program. The absence of face-to-face meetings left some reviewers feeling isolated and uncertain about the value of their contributions to the journal. As a result, participants recommended that meetings be set up to support those teachers who are contributing to the journal as writers and reviewers.
The *Journal of Classroom Research in Literacy (JCRL)* showcases classroom literacy research conducted by teacher candidates and teachers, providing a forum for them to develop as writers and readers of research and also leadership opportunities for those involved as reviewers and editorial team members. A literacy focus was chosen because of its integral role across the curriculum and across the grade levels, and also because the founder of the journal is a literacy professor. A precedent for online journals was established in April 2007 for undergraduate students in the department of life sciences at the University of Toronto: *Journal of Undergraduate Life Sciences* (http://juls.sa.utoronto.ca). Their experiences and the website served as guidelines for the development of JCRL.

The first issue of the *JCRL*, published in August 2008, included two articles by elementary teachers in Toronto, one on critical literacy in response to multicultural texts and the other on rethinking assessment criteria for writing, to encourage greater creativity and less conformity to conventions. A teacher candidate in OISE’s primary-junior BEd program wrote an article on a case study she had conducted using graphic novels to foster one reluctant reader’s motivation to read. All three contributors focused on ways to support their students’ literacy learning, and they reflected on how their innovations achieved this goal.

Professional learning is the goal of the *Journal of Classroom Research in Literacy*. To determine how effectively the journal achieved this goal, information was gathered during this project from participating editors, writers, and reviewers. The interview data will inform decision-making as the editorial team establishes practices to support teachers’ and teacher candidates’ professional learning through writing, reviewing, and reading articles in *JCRL*, and through participation on the editorial team.

**Stages of the Project**

**Creating an online journal**

On August 23, 2007, Lena Glaés-Coutts and I met to initiate the online journal, *Journal of Classroom Research in Literacy (JCRL)*. As co-editors, we developed submission procedures, reviewing criteria, a publishing agreement form, and guidelines for writers. We consulted with Julie Hannaford in OISE’s Education Commons about creating an online journal website, and she used free software, Open Journal Systems, to create the website. Hyeran Park, the graduate student member of the editorial team, helped to refine the website.

**Recruiting and training journal editors, submitters, and reviewers**

Two Master of Teaching (MT) students, Sara Ann Francis and Erika Mcmeekin, who had done outstanding work in their literacy class assignments and shown leadership in their class, accepted an invitation to serve as co-editors. The *JCRL* managing editorial team consisted of two MT students,

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**Project Focus**

- What are the perspectives of teacher candidates and teachers regarding their participation in an online, peer-reviewed literacy journal, and how has this influenced their professional development?
one vice-principal, and a graduate student. They created brochures to invite submissions, recruit reviewers, and generate a broad interest in the journal in order to create a wide readership. We sent out electronic brochures to the Toronto Reading Council listserv of 600 members, to all teacher candidates and associate teachers working in OISE’s BEd and MT programs, and to OISE graduate students. These brochures advertised two training sessions, to be held at OISE, on how prospective writers and reviewers could use the journal website to submit and review articles. At the training sessions, the managing editorial team provided models and descriptions of the types of research that would be appropriate for the JCRL, and also the necessary elements of submitted articles, such as statement of purpose, brief literature review, description of the teaching and research methods, research findings, and lessons learned about effective practice from which other teachers could benefit.

Editorial schedule
Timelines were established for different stages in the editorial process, including submission and review of manuscripts, author revisions, and copyediting.

Data Collection and Analysis
Data sources include notes from meetings and emails to the editorial team members, authors, and reviewers, as well as artifacts such as the submission procedures and the reviewer-training workshop outline. In addition, in June 2008, after the first round of reviewing submissions, a graduate research assistant randomly selected six people to be interviewed from the 10 who reviewed the five submissions, from the four members of the editorial team, and from the five writers who submitted articles, three of whom eventually had their writing published in the first edition of the JCRL. The purpose of the interviews was to determine how each person’s involvement with the JCRL had contributed to their professional growth. The interview questions were as follows:

- Talk about your experience working on the online journal. What contributions have you made and what was the demand on your time and talents?
- What attracted you to work in this capacity on the journal?
- What were your expectations when you first contacted us to work on the journal?
- How closely did your experience match your expectations?
- What was the biggest surprise in working on the online journal? Your biggest disappointment?
- What do you feel you have learned through your work on the journal?
- What would you tell other teachers or teacher candidates about the professional learning and the demands of working on the online journal?
- What suggestions do you have to increase the professional learning potential for teachers and teacher candidates through contributing to the online journal?

Interview responses were coded inductively, allowing themes to emerge from the data. The key themes—bridging theory and practice, authority of the teachers’ voices, developing writing skills, time demand, and supporting teachers and teacher candidates in their roles—are discussed in the following section.
Impact
As in previous research, this study showed that teachers who write for publication gain valuable opportunities for reflecting on and refining their teaching practices, which in turn has the potential to lead to enhanced student learning (Hatch, 2005; Stock, 2005; Whitney, 2008). The publication of JCRL enabled all of the contributing writers to reflect on their practice and receive feedback on drafts of their writing. Members of the editorial team felt that they grew professionally through reading and discussing the pedagogical and stylistic merit of the submissions.

The response of teachers and teacher candidates to the interview questions affirmed the purpose for which the JCRL had been initiated, not only to facilitate teachers’ development as writers but also to bring together theory and practice in meaningful ways that can lead to teacher autonomy and improved student achievement. The interview responses also raised issues concerning how to best support professional learning through the extension of deadlines and through ongoing feedback to contributors, and especially the reviewers.

Bridging theory and practice
An online journal that features classroom-based research and honours the perspectives of teacher-researchers creates bridges between theory and practice for those who write and read the articles.

One of the journal’s reviewers voiced a common perception that teachers and teacher candidates who were involved in the JCRL were able to “see the other side of the picture of submitting articles for publication.” In a similar vein, one editorial board member found that the experience introduced her to the academic sphere beyond her schoolwork. Thirteen teacher candidates, teachers, and principals who attended the first training meeting held on January 17, 2008, and 15 who attended a meeting on January 29 expressed interest and recognized the value of the journal. Twenty-six teachers, teacher candidates, teacher educators, principals, and graduate students signed up as potential reviewers and writers.

Authority of teachers’ voices
The first issue of the JCRL initiated a widespread dissemination of classroom research; by means of the Internet teachers in classrooms around the world can access the research and apply the ideas to their own classroom settings. Appreciating the potential for teachers to gain new knowledge and understanding about literacy teaching practices that have potential to enhance student achievement, one reviewer stated, “Being a reviewer enhances my own knowledge because I get to see relevant, current, and timely information.” The research has credibility among classroom teachers because these teachers are writing about their own experiences. The authority of their voices is clearly expressed.

Developing writing skills
Being able to communicate in writing is an important part of teaching, and many teachers have little opportunity to develop their writing skills after they complete their university degrees. The writers who submitted articles to the JCRL received specific feedback; one teacher candidate said that it taught her “to revise for a different purpose than when [she] revised for course assignments.” Because she was asked to change or omit certain types of phrases and wordings she had used, she learned about her own writing style. The two writers who had received feedback from the two reviewers and
the JCRL editorial team agreed that their writing had been sharpened and improved. As the teacher candidate writer said, her writing improved through having anonymous and “supportive, prompt, positive” feedback on the content and style of her writing. Teacher candidates and teachers who submitted their research reports to the online journal had an opportunity to learn from such feedback and develop their writing skills in the process.

**Time demand**

The practical concerns of teachers, including finding the time to write while carrying out teaching and personal responsibilities, greatly influenced teachers’ and teacher candidates’ contributions to the JCRL. This finding is similar to that in Whitney’s (2008) study of teachers who had published articles in refereed literacy journals following their involvement in the American National Writing Project. In the effort to recruit more submissions, the editorial team contacted those of the 22 educators who had not submitted an article, even though they had indicated an interest in doing so. They told us that they had been unable to find the time to write.

Yet, participants in the JCRL project were uniformly surprised that the demand on their time had not been overly burdensome. The teacher candidate said, “It was not nearly as stressful as I thought it would be.” In addition, four of the five writers revised their articles following the initial review and were able to submit their revisions before the deadline; the fifth submitter asked to have an extension of one week. Thus the first issue of the journal was published within the intended time frame in July 2008.

**Supporting teachers and teacher candidates in their roles**

One of the editorial board members described her experiences as follows: The aim was to have the journal “be open to as many teachers as possible;” the contributions were “not so highly academic” as she had initially expected them to be; and she felt very comfortable taking up her role in the JCRL process, as did the other participating teacher candidates and teachers. However, some reviewers felt isolated and expressed a need for more feedback on their reviews and ongoing instruction on writing useful reviews. One reviewer said that she had hoped to receive feedback from the editorial team on the value of the review, as well as suggestions on how to improve the review. She also suggested that reviewers be notified about whether they would continue to be asked to review articles. This concern may be similar to Whitney’s findings that some participants may feel they are outsiders in the journal writing community. The editorial team intends to address this need for greater support by holding annual meetings both to show appreciation for all the reviewers of the previous issue and to provide guidance on producing an effective review.

**Implications for Teacher Education**

Annually, OISE teacher candidates, graduate students, associate teachers, and initial teacher education faculty members conduct a plethora of classroom-based research in literacy. This project exemplifies the potential for teacher candidates and teachers to write and publish reports of their own research in the classroom. Teacher educators can encourage teacher candidates to co-write with their associate teachers: This writing might include reports of action research they conduct for their initial teacher education course assignments or reports of research that they may undertake while exploring questions and issues together during practica or internships. These articles would provide a forum for
teacher candidates and teachers to work through the ambiguities and complexity of classroom teaching. In addition, writing for a wide audience provides an authentic purpose for teacher candidates’ written assignments. The teacher candidate who submitted an article, for example, felt that she was writing “for [her] own gains instead of writing something [she] was told to write about for a specific course.”

The process of conducting research opens teacher candidates’ eyes to the potential of action research for their own learning and development as teachers. Conducting research also fosters a perspective that learning is an important part of teaching and that teachers are always gathering and reflecting upon new information to improve their practice. Having the research reports published in an online journal raises the profile of the teachers’ research and of classroom-based literacy research in general. Furthermore, teachers who read the online journal gain an awareness of the possibilities for conducting their own classroom-based research.

Practical Applications
Teachers may use their experiences in reviewing and writing for the JCRL to guide their writing instruction. They can discuss with students what types of feedback they would find most useful to guide their writing. The feedback that reviewers provide is based on their perception of the level of engagement and interest that the intended audience will have with the paper, on the clarity of communication of research methods and results, and on the depth of insight into the topic. These criteria could provide a foundation for peer responses to student writing and for teachers’ feedback on student writing. This would reinforce for student writers the importance of achieving a purpose and communicating clearly to an audience, which are features of writing that all writers strive to master. Teachers could also encourage students to carry out their own inquiries into topics of interest that are related to any curriculum area. The guidelines on the JCRL website (https://jps.library.utoronto.ca/index.php/jcrl) may help teachers and students to consider how to format their research reports in the best way to communicate to others what they have learned.

Next Steps
According to participants in this project, involvement with the JCRL will contribute more to their professional development when the following needs are addressed: revised timelines, communities of teachers who research their practices and write about it, and enhanced communication.

The timelines were problematic, as teacher candidates did not have time to write up their action research while in the throes of their initial teacher education program, and classroom teachers were involved in year-end activities as they tried to meet the May and June dates for manuscript submission and revision respectively. In the future, the date for submissions will be in late December.

Although the writers expressed satisfaction with the contact they had with the editorial team, the reviewers felt that they did not have enough information and that they needed feedback on their contributions. One reviewer said that although the guidelines for reviewing were helpful, she had spent time copyediting and was informed only after submitting her review that copyediting was
not part of the reviewer’s role. Clearly, more attention needs to be paid to the review process. The reviewers recommended establishing regularly scheduled information sessions exclusively for reviewers, including a session at Toronto Reading Council conferences. Like the highly successful National Writing Project that has been in place for many years in the United States, these sessions, together with sessions for writers to get feedback on articles they are crafting for submission to the JCRL, would create a community of teacher researchers and writers. This would also address concerns about teachers and teacher candidates being able to see themselves as insiders rather than outsiders in the educational journal writing community.

The two reviewers also advised greater communication between the editorial team and reviewers immediately following the review submission deadline. The online format, in one reviewer’s view, understandably led to contact only via email, but the teacher-reviewer had a sense of “remoteness” because she had never met or spoken to anyone on the editorial team. Because many reviewers are interested in becoming writers, the information sessions and ongoing contact will be important for nurturing their confidence in writing about their teaching. This process might also raise the profile of the journal and bring in greater numbers of submissions.

Future research could explore the impact of the JCRL on teachers and teacher candidates who read the articles. The journal’s website could become interactive to allow teachers and teacher candidates to have dialogue with one another about the research reported in the journal.

Acknowledgements
I have truly enjoyed working with Lena Glaés-Coutts, Hyeran Park, Sara Ann Francis, and Erika Mcmeekin and thank them for their inspiration, hard work, and faith in this fledgling journal. I thank Julie Hannaford, who made the technological side of establishing an online journal as easy as figuring out a password, as well as Carol Rolheiser and Kathy Broad who supported this journal initiative. Also, I am very appreciative of Kerrie Kennedy’s tireless work and cheerful professionalism in recruiting and interviewing participants for this research study and grateful to those who wrote and reviewed for the JCRL and participated in the interviews.

References

Shelley Stagg Peterson is an associate professor in the Department Curriculum, Teaching and Learning, OISE. Shelley’s research interests include writing instruction and assessment, cross-curricular and digital literacies, socio-cultural issues in literacy, and children’s literature.
TEACHERS SUPPORTING TEACHERS IN USING A TEN-DIMENSIONS FRAMEWORK FOR IMPROVING ELEMENTARY MATHEMATICS

Douglas McDougall

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Project Partners
• Teachers and principal of school hosting OISE’s teacher candidates
• Masters student: Jackie Sohn

Abstract
The purpose of this project was to investigate peer coaching as a professional development technique for improving mathematics education in elementary schools. The three stages of the project included an introduction to the ten-dimensions framework for teachers and an administrator, the development of collaborative teacher teams, and the setting of a benchmark for mathematics improvement in elementary schools. The ten-dimensions framework, which describes ten elements of mathematics education: (1) program planning; (2) meeting individual needs; (3) classroom environment; (4) tasks; (5) constructing knowledge; (6) communicating with parents; (7) manipulatives and technology; (8) student communication; (9) assessment; and (10) teacher’s comfort with mathematics (McDougall, 2005). This framework became a shared focus for the participating teacher education instructors and associate teachers. They also considered its impact on teacher candidates and, ultimately, the teaching and learning of mathematics. An outcome of the project was the recognition that the ten-dimensions framework, combined with peer coaching, could be shared with other schools affiliated with OISE’s Initial Teacher Education program.
Reform in mathematics teaching has not been given the same emphasis as reform in literacy teaching. Often, even the well-financed initiatives have to struggle to make an impact on improving mathematics learning. According to a number of research studies, teachers who have high confidence in their ability to improve student achievement in standards-based mathematics programs do produce higher student achievement (Herman, Meece, & McCombs, 2000; Ross, Hogaboam-Gray, & Hannay, 2001). Many case studies show that teachers who lack knowledge about the teaching and learning of mathematics present a distorted view of math reform (Leavy, 2004; Spillane, 2000). However, it is challenging for teacher educators to change teacher knowledge and confidence about teaching mathematics (Ross, McDougall, & Hogaboam-Gray, 2002; McDougall et al., 2000).

Mathematics education reform documents (NCTM, 1989, 1991, 2000) emphasize the need for change in the mathematics classroom environment from one in which the teacher transmits knowledge to the students to one in which teachers and students interact as a community of learners in mathematical investigation and exploration. There are many challenges involved in creating such a learning community and also in determining the extent to which teachers progress towards this ideal of math reform. Teachers do adapt to change, but they require instruction on the nature of the required changes. Math reforms are complex, however, and most reform efforts underestimate the complexities. Teachers can help each other change, and peer coaching has been used to help teachers improve their teaching practices (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003).

Since the intent was to support associate teachers who want to improve their teaching and learning of mathematics, this project aimed to improve teacher education in the following ways: (1) associate teachers observe teacher candidates in the mathematics classroom and provide advice on how to improve; (2) elementary school teachers are introduced to the ten-dimensions framework (McDougall, 2005) that can guide them in changing their teaching of mathematics; (3) elementary school teachers experience professional development activities that are connected to mathematics teaching and learning in their own contexts.

Stages of the Project
This research project focused on one school affiliated with OISE’s MT program, a two-year teacher preparation program. The three stages of the project included introducing the ten-dimensions framework to teachers and a principal, establishing teacher collaborative teams, and setting a benchmark for mathematics improvement in elementary schools.
Introduction to the ten-dimensions framework

All teachers in the school attended a one-hour session that introduced the project and outlined the ten-dimensions framework, along with a beliefs and attitudes self-assessment survey. The ten-dimensions framework describes ten areas or dimensions that are elements of mathematics education: (1) program planning; (2) meeting individual needs; (3) classroom environment; (4) tasks; (5) constructing knowledge; (6) communicating with parents; (7) manipulatives and technology; (8) student communication; (9) assessment; and (10) teacher’s comfort with mathematics (McDougall, 2005). Each of these dimension centres on a specific area that teachers need to focus on within mathematics classrooms. When a teacher improves in one of the dimensions, there is often some improvement in other dimensions. The purpose of this specification of dimensions is to enable teachers to work specifically on improving one area of teaching practice, knowing that other areas are also improving.

Self-assessment survey

It is important for principals and teachers to understand their own practices and attitudes towards mathematics education before they embark on changing their teaching. The “Ten Dimensions of Mathematics Education Continuum: A Rubric for Mathematics Teaching” is a tool for collecting such information (McDougall, 2005). The continuum provides a description of teaching behaviour, separated into four levels. At level one, a teacher would teach in a more traditional way; at level four, a teacher would be more closely aligned with current mathematics reform research. Teachers can use the continuum as a self-assessment tool to help them identify their own level of mathematics teaching related to each dimension. Teachers and principals can also use it as an observation tool to identify which dimensions should be part of a teacher’s plan for professional development. Indicators for each level in each dimension of the continuum were developed through research projects in which teachers were observed on multiple occasions in their classrooms (McDougall et al., 2000; Ross et al., 2002; Ross, McDougall, Hogabaum-Gray, & Lesage, 2003; Ross, McDougall, & Lesage, 2001). In this project, pre- and post-self-assessment surveys were used to gather data from the teachers.

Peer-coaching sessions

Eight teachers formed four pairs, and each pair met during a pre-observation conference in which each teacher was given a form containing several initial questions and other questions to assist their observation of the dimension that the teacher who was being observed had identified. These questions constitute an observation and question guide for peer-coaching pairs, which are based on guides developed in earlier studies (McDougall, 2005; Ross, Hogaboam-Gray, & McDougall, 2000; McDougall et al., 2000). The discussion during the conference was guided by these questions, including, what are you planning to do today in the classroom? What did you do in the past in this topic? What would you like me to observe? The conversations were audiotaped and transcribed.

The ten-dimensions framework provided guidance for teachers as they interacted and discussed mathematics teaching in elementary schools. The teachers met to select the dimensions on which they wanted to focus the discussion, negotiate goals for improvement, devise strategies to implement goals, observe teaching, and provide feedback.

Workshop on the ten-dimensions framework

At the end of the project, a workshop on the ten-dimensions framework and how it can be used to improve mathematics education was offered at the school. In this workshop, the principal and teachers worked together to learn more about the ten dimensions of mathematics, to explore some
of the dimensions in detail, and to discuss the peer-coaching process. The teachers completed the post-self-assessment survey, and they each identified two dimensions that they wanted to focus on during the next year.

Data Collection and Analysis
The data collection included the pre- and post-self-assessment surveys completed by the eight teachers and also interviews conducted with eight teachers and the principal to gather background information, goals for mathematics education, and current practices in teaching mathematics. Interviews were audiotaped and transcribed, and the peer-coaching pre- and post-observation sessions were also audiotaped.

The data analysis included an initial exploratory review of the data and a constant comparison analysis (Miles & Huberman, 1994) of interview transcripts, field notes, observation notes, and feedback from participants. Computer qualitative research software, NVIVO 8, was used to assist in the analysis of the data. The initial coding scheme was based on the characteristics of mathematics reform and was elaborated based on the emerging themes. The use of codes such as context, diversity, peer coaching, professional development, distributed leadership, and each of the ten dimensions helped to further illustrate the richness of the data.

Impact
Four major results from this project have the potential to advance knowledge about teaching and learning in elementary school mathematics.

Use of mathematics improvement tools
The teachers became familiar with a number of mathematics improvement tools. They completed an attitude and beliefs self-assessment survey to identify which of the ten dimensions of mathematics education they needed to focus on for their mathematics professional learning. The study showed that teachers began to model the use of mathematics language during the third and fourth peer-coaching cycle. The teachers became more precise in their discussions during the pre- and post-observation interviews, particularly in sharing their observation goals.

The teachers became more reflective when they described their future goals. They used the ten-dimensions framework to discuss where they wanted to go next with improving their mathematics teaching. The principal was also able to use the results of the beliefs and attitude survey to further define the goals for mathematics teaching in the school improvement plan.

Peer-coaching process
The peer-coaching process encouraged teachers to gather data on what they saw and what they heard in the classroom. In this way, they learned to provide non-evaluative feedback to one another as part of a peer-coaching process that supported them in becoming better teachers. The teachers found that having access to the observation guides for each of the ten dimensions facilitated their peer-coaching. They also appreciated the support of the principal through his encouragement of the process and the provision of occasional teachers to cover the classes they had to miss during the peer-observation sessions and subsequent discussion times.
Teacher knowledge of mathematics
The professional development workshop on mathematics education increased teachers’ knowledge about mathematics and their understanding of instructional strategies for the teaching of mathematics. The teachers improved their ability to talk about their understanding of mathematics teaching, and they took part in some mathematics activities that enabled them to uncover some of their misconceptions about mathematics concepts.

Community of learners
The teachers were able to build a community of learners in mathematics at their school. They worked together to share resources and to support each other in their pursuit of mathematics education improvement at the school. The principal was aware of the project, attended all sessions, and provided time and support for the teachers to meet and discuss mathematics ideas. The principal provided a safe and judgment-free environment in which teachers could participate if they wanted to be part of the project. He also had a comfortable rapport with the teachers, which is a precondition for teachers successfully creating a professional development community.

Implications for Teacher Education
A number of implications for teacher education result from this project. First, the ten-dimensions framework helps associate teachers identify areas of their math teaching that require support and attention. When associate teachers are knowledgeable about this framework, they may be able to better assist teacher candidates in learning to teach mathematics. The survey also helps teachers conduct an initial self-assessment of their strengths and the areas that require additional attention.

Second, the peer-coaching process of pre-observation discussions that focus on teachers’ interests and questions helps teachers identify what information should be gathered during the observation of the lesson. The post-conference meeting helps associate teachers talk about what they hear and what they see. Third, the project can have an impact on teacher education because participating teachers will learn to use a continuum of teaching practice in mathematics, which enables them to be more effective mentors in mathematics. The ten-dimensions continuum is useful for teacher candidates in that it describes good teaching in mathematics. This continuum also helps teacher candidates and associate teachers to use a common language around improvement in mathematics teaching. Initial teacher education instructors can also use the ten-dimensions framework for teaching mathematics education to teacher candidates. Classes on each of the ten dimensions as well as the use of written and video case studies can help teacher candidates improve their understanding of the teaching and learning of mathematics.

These collective efforts support the implementation of mathematics education reform. While it is difficult to make sustained changes in the teaching of mathematics, the use of the ten-dimensions framework helps to identify areas for improvement and to focus professional development activities to meet the needs of teachers.
Practical Applications
There are a number of practical ideas for the classroom. First, associate teachers and teacher candidates can use the beliefs and attitude survey to benchmark their starting points and monitor their growth in mathematics teaching and learning. Second, associate teachers can use the observation process with teacher candidates in many ways. The pre- and post-observation questions help the associate teacher to guide the conversation about what the teacher candidate did and said in the class lesson. The observation templates are flexible, and they help the associate teacher gather information about different areas of teaching suggested by the teacher candidate. It can also help facilitate open-ended questions that may be posed by both associate teacher and teacher candidate. Third, the observation process can be used by teachers, as they work in peer-coaching relationships. Fourth, teachers can revisit the survey over time to monitor their own growth and changing needs as they explore new dimensions of mathematics education.

Next Steps
This project has initiated a process directed towards increasing the capacity for mathematics education reform through teachers supporting other teachers. The participating teachers gained some experience in peer coaching and the provision of non-evaluative feedback. The next step is to invite other teachers in the school to be part of the peer-coaching project in 2008/2009. Subsequently, the newly acquired expertise of the eight teachers in using the ten-dimensions framework and in peer coaching will be shared with other schools associated with OISE’s Initial Teacher Education program.

For schools that are focusing on mathematics improvement, the next step is to use the attitudes and beliefs survey to collect data on the strengths and areas for improvement from each teacher. These data can be used to identify school goals in mathematics teaching and learning and to provide a focus for professional development and resource support. Teachers can also use the data for their own professional development plans.

This research has led to the following question: If initial teacher education instructors and associate teachers share a focus on the ten-dimensions framework, what effect will this have on the mathematics teaching and learning of teacher candidates? To answer this question, further work is needed to help teacher candidates focus their learning of teaching practices in mathematics by providing instruction in the ten-dimensions framework and its use. In time, and also with the aim to improve the teaching and learning of mathematics, other OISE host schools will be provided with a workshop on the ten-dimensions framework and assistance in using the peer-coaching process.

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References


**Douglas McDougall** is an associate professor in the Department of Curriculum, Teaching and Learning, and the co-ordinator of the two-year Master of Teaching program, OISE. Doug’s research interests include improvement in the teaching of mathematics and the use of technology in mathematics education.
AUTHENTIC VOICES FROM THE FIELD: HOW TEACHERS CAN BENEFIT FROM USE OF EFFECTIVE FEEDBACK STRATEGIES

Bev Strachan and Kathy Broad

Project Coordinators

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- Kathy Broad: Executive Director of OISE’s Initial Teacher Education program

Project Partners

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- George Syme Community School: Lori Haywood and Darci Palter, associate teachers
- White Haven Junior Public School: Rosanna Fiorino, associate teacher; Devika William-Yu, associate teacher and teacher liaison
- Teacher candidates from the 2007/2008 Crosstown elementary cohort in the Initial Teacher Education program at OISE: Timothy Wayland-Au, Catherine Im, Ashley Bishara, Ramona Rouhani

Abstract

This project explores the impact of associate teachers’ metacognition about mentoring conversations during practice teaching. As a baseline, 55 teacher candidates were surveyed about their views on effective lesson debriefings, and four associate teachers and four teacher candidates in junior classrooms were filmed during debriefing sessions following practice teaching lessons. The associate teachers then met to discuss their feedback and debriefing practices and to learn additional strategies for providing feedback when participating in
mentoring conversations. The additional strategies included beginning with a scaling question, paraphrasing, and selecting an area of focus. There was a second filming of the teacher candidates’ lessons and the post-lesson debriefing conversations, which were led by the associate teachers. The associate teachers and teacher candidates viewed the film and later took part in two separate focus groups to discuss their learning from participating in the professional dialogue and filming processes. As a result of the project, the associate teachers identified changes in their practice, including the ability to focus on the processes and language used during feedback sessions. The teacher candidates recognized that the debriefing sessions positively affected their learning because of the increased focus on feedback.

**Project Focus**

The project was designed to explore the following questions:

- How does engaging in professional dialogue about feedback strategies affect the teaching and mentoring practices of associate teachers and teacher candidates?
- How might a digital resource composed of practice teaching lessons and post-practice teaching debriefing sessions be used to facilitate teachers’ professional learning?

Associate teachers have an essential role in facilitating learning for teacher candidates during their practicum experiences (Feiman-Nemser, 2001b). Recently, greater attention has focused on the role of associate teachers in mentoring teacher candidates to reflect upon and assess their practice and learning in order to adjust their instructional practice (Feiman-Nemser, 2001a; Athanases & Achinstein, 2003; Yendol-Hoppey, 2007). Crasborn, Hennissen, Brouwer, Korthagen, and Bergen (2008) analyzed videos to discover how explicit discussion and attention to the skills and actions of associate teachers encouraged teacher candidates’ reflection. Their results note an increased amount of time spent on the use of effective debriefing strategies such as “starting with an open question, summarizing content, asking for concreteness, helping make explicit and finding alternatives” (p. 507). Strong and Baron (2004) and Tang and Chow (2006) indicate that further study is needed on the impact of mentoring conversations. The Authentic Voices from the Field study continues this inquiry by focusing on the interventions and dialogue used to strengthen mentoring conversations and then by assessing the impacts of these strategies and conversations on the learning and instructional practices of associate teachers and teacher candidates, particularly in literacy lessons.

Four teacher candidates and four associate teachers were involved in this project. The associate teachers had all been teaching for over seven years and had been in their present schools for more than two years. The teacher candidates were completing their second four-week practicum of OISE’s one-year teacher education program. Two junior-intermediate teacher candidates were team teaching combined grade four classes. Two primary-junior teacher candidates were teaching in a grade four and a grade six classroom.
Stages of the Project

Pilot study: Role and stance of effective mentors

This project began in 2006 with Authentic Voices, phase one, a small pilot study in which an associate teacher was filmed providing feedback to two teacher candidates after they had taught literacy lessons. The footage from these debriefing sessions was used to foster discussion regarding the roles and stances used by the associate teacher when providing feedback to teacher candidates. This initial digital resource was then used as a teaching and learning tool with graduate students, members of OISE’s School/University Partnerships Office, colleagues, and visiting educators from other universities.

Initial data collection and filming

In the current phase of the project, the participants included four associate teachers and four teacher candidates who were teaching in junior classrooms in schools of similar size in two different quadrants of an urban school district. To begin, the participants completed surveys that inquired about their experiences and understanding regarding effective feedback and debriefing sessions. In addition, the 60 teacher candidates within an elementary teacher education cohort were invited to complete the survey; 55 surveys were completed and returned. Then, initial debriefing sessions involving each of the four associate teacher and teacher candidate teams were filmed in order to raise awareness of mentoring conversations and feedback strategies prior to the focus group discussions regarding successful feedback sessions.

Professional learning

Following the filming of early debriefing sessions, the four associate teachers took part in a half-day professional learning session conducted by Jim Strachan, a district-wide program coordinator. The session goals were to explore the fundamentals of listening, broaden the repertoire of mentoring strategies and approaches, and intentionally share knowledge and practice. Participants reviewed the work of Laura Lipton, Bruce Wellman, and Carlette Humbard regarding the roles and stances of effective mentors as consultant, collaborator, and coach. Participants then engaged in focused observation of a videotaped lesson and were introduced not only to the use of focused observation but also to the use of scaling questions and paraphrasing as methods for engaging teacher candidates in reflection about their lessons.

Scaling questions (Bucknell, 2000) involve asking teacher candidates to rate the lesson that they taught on a scale of 1 to 10. If the teacher candidate rates his or her lesson as a 7, the associate teacher would then ask the question, “What were the good things that made that lesson a 7?” After hearing the response, the associate teacher would then ask, “If you were to bump your lesson up a notch, say to an 8, what are some things you might consider doing to make it an 8?”

The associate teachers discussed components of effective listening that are needed to encourage further dialogue; the emphasis was on paraphrasing or restating what the teacher candidate says. Each associate teacher also chose a specific aspect of a filmed lesson to structure a focused discussion, particularly for the purpose of developing skills in focused observation. The professional learning session provided opportunities for associate teachers to practise listening and coaching skills. At the end of
the session, the associate teachers selected one of the strategies they had learned to plan the specific next steps for implementation with their respective teacher candidates.

Each associate teacher received a copy of the book *Mentoring Matters: A Practical Guide to Learning-Focused Relationships* (Lipton, Wellman, & Humbard, 2003) and a workshop handbook, “Building Effective Mentoring Relationships,” created by Jim Strachan, the facilitator of the professional learning session.

**Filming the lessons and debriefing sessions**

A second filming session included both the literacy lessons taught during practice teaching and the debriefing sessions. This filming took place after the summative evaluations had been completed to ensure that the evaluation of the teacher candidates was not influenced in any way by the study. The video provided opportunity for analysis and the development of metacognitive skills. The debriefing session also involved critical discussion of ways to structure meaningful, learning-focused conversations. Each associate teacher concentrated on using one of the strategies that had been introduced during the professional learning session (i.e. scaling questions, paraphrasing, focused observation). Each debriefing session was different, reflecting the different settings and areas of emphasis. At one school, two associate teachers and two teacher candidates were involved in the same debriefing session because they had co-taught a lesson. In that debriefing session, the associate teachers chose to introduce scaling questions. At the second site, one associate teacher concentrated on the use of paraphrasing, and another teacher asked her teacher candidate to choose a focus for her observation.

**Filming the focus group reflective conversations**

The four associate teachers and the four teacher candidates attended separate focus group sessions at Curriculum Services Canada. First, each group independently viewed the video of the lessons and debriefing sessions. Then each group was filmed participating in a focus group discussion. The discussion focused on their reflections regarding the professional learning session as well as the experience of being filmed. During their focus group, the associate teachers were asked to consider the importance of their role as mentors to teacher candidates, and then they reflected on the various learning-focused conversation strategies (e.g., scaling questions) that they had examined during the professional learning session and had experimented with during their debriefing sessions with the teacher candidates.

In their focus group, the teacher candidates were asked to reflect on the methods that their respective associate teachers used when debriefing their lessons and also on their feelings and experiences during these sessions. The themes that arose during the conversations with the four teacher candidates reflected the same themes that emerged from the surveys that had been collected from the larger sample of teacher candidates (N=55), as well as the elements highlighted in the focus group discussion of the associate teachers. The themes from the surveys included the provision of regular, immediate, focused feedback; the asking first for the opinion and evaluative comments of the teacher candidate (e.g., how do you think the lesson went?); and the provision of both positive and constructive feedback.
Data Collection and Analysis

This project utilized a collaborative action research approach (Sagor, 1993; Hubbard & Power, 2003). Data were initially collected through surveys, which were analyzed for patterns of response. Subsequently, data were gathered through the filming of lessons, debriefing sessions, and two focus group discussions. This project used the qualitative methodology of analysis of a study group (Carroll, 2005). The filmed debriefing sessions were a data source for shared inquiry by associate teachers and researchers. Rich data were generated through the discussion of the associate teachers who inquired into their own practices and shared their challenges and successes related to the mentoring conversations. The collected data is a direct result of the willingness of the associate teachers and teacher candidates to de-privatize their practice and share their strengths and their questions.

The debriefing sessions and focus group sessions were analyzed and coded for themes. The themes were raised and shared with participants for validation and critique (Carroll, 2005). The themes were also captured in an edited digital resource that was developed from the research.

Impact

During this study the main challenge had to do with finding time to complete the various stages of the project, given the rigorous requirements inherent in the practicum and the busy school calendar. Despite this difficulty all participants readily gave of their personal time to complete the data collection and analysis. As a result, they were able to identify how their perspectives, skills, and actions had changed through their experiences of professional learning and enhanced metacognition related to their practice as teachers or as mentors. Their experiences of being filmed also assisted them to be more conscious and aware of their actions. The impact of this project on associate teachers and teacher candidates are discussed in the following section.

Associate teachers

The associate teachers indicated that the opportunity they had to dialogue and think critically and metacognitively about their practice was extremely valuable and altered their practice not only as associate teachers but also as classroom teachers. They indicated that paraphrasing and asking scaling questions are helpful instructional strategies for encouraging problem solving and goal setting for students as well. They mentioned that they wished they could revisit some earlier debriefing conversations to change them based upon their learning. They suggested that the process of being filmed heightened self-awareness and provided rich opportunities to consider language and interaction and the power of questions, words, and listening.

The four associate teachers stated that their practices had been refined through participation in the professional learning session and the filming experience. A clear theme for them was the shifting of the conversation focus onto the needs and direction of the teacher candidate. In two cases, the use of scaling questions assisted them to focus on the teacher candidates’ perceptions and needs. As one associate teacher commented,
We used the scaling question … it gave us a sense of whether or not we were on the same page with our teacher candidate. It allowed everything to flow nicely afterwards … it allowed the teacher candidate to give a lot more input into the whole debriefing and gave them more ownership of their own work and how they could improve upon it.

Another associate teacher indicated that by asking the teacher candidate to identify the area for a focused observation it was possible to reduce the feedback to a more manageable amount and focus it on a targeted area of need and interest. According to this associate teacher, the process is incredibly powerful:

I had my student teacher put a focus right on his lesson. Instead of spending little chunks of time on lots of things we were able to spend quality time on one thing that he was really concerned about. Actually, it really helped for the second block for me and for my student teacher.

Paraphrasing was a strategy that empowered the teacher candidates to unpack their own thinking and problem solve collaboratively with the associate teacher. It also dramatically altered the communication style of one of the associate teachers.

Paraphrasing was definitely something I wanted to focus on. I knew all of the components of being a good listener, but in my head there were so many things going on. I couldn't be a good listener because I was planning what I wanted to say. Did I paraphrase? Did I pause … did I do all of those things? I realized I needed to relax. The second debriefing session was much easier. I really was taking my cues from [my teacher candidate] because she was leading me down the path or I was leading her down the path where we both wanted to go. We naturally went there, and it became more meaningful because it came from her; it wasn't from me. She realized it, she'll remember it, she'll implement it … not because her associate teacher told her, but because she figured it out herself.

**Teacher candidates**

According to evidence collected from the 55 initial surveys and from the teacher candidate focus group, teacher candidates strongly valued (a) being asked to reflect upon their lessons, (b) having associate teachers who are positive and encouraging, (c) being provided with specific feedback on an area that they had identified within their own practice, and (d) having feedback immediately after the lesson. Two of the teacher candidates in the study also stressed that constructive suggestions for growth were appreciated.

Evidence of impact on the teacher candidates’ understanding and practice was clear in the focus group discussion. They explained that they had become more metacognitive and critically reflective about their pedagogy. According to one teacher candidate, the debriefing session “made me reflect back—What did I do well and what didn’t I do well? How do I feel about my lesson? How do I feel I performed? I thought that really made a difference—it really made me reflect.”
Two teacher candidates said that the use of scaling questions strongly impacted their reflection on lessons. One described how the scaling questions furthered thinking, “It actually really helps you reflect by asking that question because you have to think about why. If I said I gave my lesson a 6, she would ask what made it a 6? I can’t just give myself a number and not explain why.”

Another teacher candidate began to use the scaling questions in an even more sophisticated way, as she made a distinction between the rating of her own practice and the rating of the effect of her teaching on the students’ learning.

I found myself needing to give two different ratings. I felt that I gave this lesson an 8 out of 10 in effort, but I felt like the student response to me was a 7. How do I bring the students up to where I feel the lesson was an 8? I found I needed to differentiate the two. I could feel like a lesson was absolutely amazing … but if the student response, if they weren’t enthusiastic, if they weren’t engaged, then I would have to re-evaluate that 8 I gave myself.

The impact of focusing upon the needs and direction of the teacher candidate was another important theme in the teacher candidate focus group. They described the need for a safe environment, “where (it) felt comfortable to try, make a mistake, and then learn from that mistake.” Another teacher candidate stressed the importance of timely and specific feedback that focused upon the areas that she had identified.

For me, the important thing was to get immediate feedback. I liked it when my associate teacher gave me feedback right after the lesson. That way, it was fresh in my mind and in her mind; so we were able to reflect back on what had happened and have a good discussion about the lesson.

All teacher candidates indicated and demonstrated that they had increased their capacity to reflect upon their practices and to be more discerning throughout the practicum. The mentoring role taken by their associate teachers was clearly viewed as an important reason for this growth.

Implications for Teacher Education

This project has highlighted the relationship between associate teachers and teacher candidates, pointing to the pivotal importance of the associate teacher as an “educative mentor” and the teacher candidate as an active constructor of knowledge.

To facilitate the growth of teacher candidates as they develop their practices through field experiences, teacher education programs will need to provide more attention and resources to the development of mentor teachers (Darling-Hammond, Hammerness, Grossman, Rust, & Shulman, 2005; Sanders, Dowson, & Sinclair, 2005). In particular, the “Authentic Voices” study underscores the power of the debriefing conversation in the development of skills of beginning teachers. Other research reinforces
the value of assisting mentor teachers to gain expertise and skill in providing feedback and framing effective mentoring conversations (Tang & Chow, 2007; Whitehead & Fitzgerald, 2007; Crasborn et al., 2008). The role of these conversations in activating the knowledge and self-assessment skills of teacher candidates in the debriefing sessions was also clear from the data analysis. Focusing upon the strengths and learning needs of the teacher candidates and allowing the learner to lead both the discussion and the learning are rich areas for further development (Tang & Chow, 2007).

The need to create opportunities for teacher educators in their field and university settings to discuss and dialogue is evident: “The professional dialogues among supervisors help to expand the repertoire of supervisory practices which supervisors can employ” (Tang & Chow, 2007, p. 1081). This study has revealed that a digital resource has the potential to be an effective springboard for discussion and reflection on teaching practice. The digital resource created from the filmed lessons and debriefing sessions in this study, will be a valuable resource for use in teacher education programs.

The following elements from the project provide the framework for the digital resource: (a) role of the associate teacher, (b) example literacy lessons, (c) example debriefing conversations, and (d) reflections of associate teachers and teacher candidates. All of these elements are proving useful as artifacts that spur professional dialogue based on authentic experiences.

This record of the lessons and the post-lesson debriefing sessions provides greater opportunity for educators who are working in a variety of capacities and locations to work with an “example of practice” that can support them as they examine what constitutes effective feedback sessions and teaching practice. To date this resource has been used for mentoring sessions with coaches, mentors, and associate teachers within the Toronto District School Board. It has also been shared with a group of educators from Pakistan and with some colleagues within OISE.

The efficacy of collaborative inquiry and co-learning by experienced teachers, beginning teachers, and teacher educators has been powerfully demonstrated in this study. By sharing inquiry questions, experiences, and knowledge, all members of the learning community gained expertise and refined practice.

**Practical Applications**

The feedback strategies, including scaling questions, paraphrasing, and focused observation and feedback are transferable to instruction with students, particularly to facilitate self-assessment and goal setting. For example, when engaging in individual writing conferences with students, the teacher can ask the students to rank themselves on a particular criterion; they can ask for evidence for the ranking and then assist students to determine what to work on to move their rating to a higher level. Paraphrasing can also be helpful when scaffolding students’ problem solving or thinking as they develop academic, social, and communication skills. Focused observation is also useful for teachers when they are engaged in assessment, as it helps teachers be strategic and targeted in their observation of students and in gathering data for next steps in teaching and learning. As well, filming and video can
be used to assist in developing skills in the classroom. For example, students can view video of other learners or experts engaged in giving oral presentations, and then they can analyze those exemplars to determine criteria for competent performance for their own work.

Next Steps
The Authentic Voices digital resource will continue to be used in a variety of settings by many different educators. The Associate Teacher Advisory Committee at OISE and liaison teachers will provide their advice on effective ways to use this resource. The resource will be made available on the OISE website to provide access to many educators who may wish to explore debriefing conversations via this medium. OISE’s School/ University Partnerships Office will introduce this resource to faculty advisors and field supervisors who observe teacher candidates during practice teaching sessions in order to facilitate discussion about feedback sessions. Our research partner, Jim Strachan will also use this resource with mentors and associate teachers in the district.

As well, we will continue to review and mine the large amount of unused footage to develop other resources that can support successful mentoring conversations and feedback. We have continuing questions about the best ways to provide opportunities for this kind of dialogue and learning for those who support beginning teachers. How can we encourage the kind of metacognitive, explicit discussion and sharing of practice? How can we work more collaboratively to facilitate learning for beginning and experienced teachers and teacher educators? To move forward with our questions, we plan to continue to seek and listen to the authentic voices of OISE’s associate teachers and teacher candidates.

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References


Bev Strachan is a co-coordinator of the Crosstown cohort in the Initial Teacher Education program at OISE. Bev’s research interests include mentorship and literacy instruction in teacher education and primary/junior classrooms.

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LESSON STUDY COLLABORATION AMONG ASSOCIATE TEACHERS AND TEACHER CANDIDATES TO IMPROVE TEACHING AND LEARNING IN MATHEMATICS

Carrie Chassels and Bathseba Opini

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- Dixon Grove Junior Middle School: Neil Quimby, principal; Nardaya Dipchand, vice-principal; Anne McIlroy, guidance counselor; Kris Blake, grade six teacher; Hilary Foley, grade six teacher
- OISE’s North cohort teacher candidates: Kaleen Balliram, Jovina Da Costa, Simrat Kapoor, Shelby Martelluzzi, Manju Sati, Victoria Wappel

Abstract

This research project was designed to examine the benefits and challenges of lesson study collaboration among associate teachers and teacher candidates who have the aim of improving teaching and learning in mathematics. Six teacher candidates and four associate teachers from two elementary schools collaborated to research, plan, deliver, observe, and debrief mathematics lessons for a grade one class and a grade six class. The project findings indicate that teacher candidates were enthusiastic about lesson study and also improved their understanding of certain mathematical concepts, learned new instructional strategies, and developed
skills to observe and analyze student learning. The teacher candidates expressed a commitment to professional collaboration and an interest in initiating lesson study groups when they enter the teaching profession. The participating associate teachers were also enthusiastic about lesson study and appreciated the opportunity to connect with colleagues and share their professional knowledge. While they were convinced that lesson study is a valuable learning experience for teacher candidates, they expressed concern that lesson study is too time consuming for practising teachers, particularly given the current structure of the school timetable and their commitments to other school initiatives.

**Project Focus**

- To support improved teaching and learning in mathematics through lesson study collaboration among associate teachers and teacher candidates
- To examine the benefits and challenges of lesson study collaboration among associate teachers and teacher candidates
- To provide an opportunity for teacher candidates to see the possibilities of lesson study beyond their initial teacher education program

Teachers who engage in lesson study collaborate in a number of ways: Together, they formulate goals for student learning; research, develop, plan, conduct, and observe a lesson to realize these goals; observe student activities and responses during the lesson to collect and share data; and then use the data to refine the lesson for future implementation. North American researchers have described lesson study—a crucial process for professional learning among teachers in Japan—as a promising model for incremental and sustained improvement in the teaching and learning of mathematics in North America (see Fernandez & Chokshi, 2002; Lewis, Perry, Hurd, & O’Connell, 2006; Ma, 1999; Richardson, 2000; Stigler & Hiebert, 1999; Takahashi & Yoshida, 2004).

For educators who are interested in strengthening their professional learning communities and improving educational outcomes for students, the collaboration and the emphasis on teachers as professionals who actively engage in and apply research are the most compelling aspects of lesson study.

Stigler and Hiebert presented their influential analysis of the Third International Mathematics and Science Study (TIMSS), a cross-national videotaped classroom study of teaching in 231 eighth-grade mathematics and science classrooms, in *The Teaching Gap* (1999). They also introduced the concept of lesson study to a broad North American audience of teachers, administrators, and researchers. Stigler and Hiebert argue that the practice of lesson study, coupled with a focus on critical problem solving and deep conceptual understanding, contributes to consistently superior achievement in mathematics among Japanese students. However, the authors emphasize that educational change is difficult to achieve because teaching and learning are culturally engrained activities. Educational change is most likely to occur when teachers have opportunities to collaboratively analyze classroom practice, identify techniques that can be used to pose and discuss rich mathematical problems that focus on concepts and connections among mathematical ideas, and to develop skills to implement new approaches in their practice. Stigler and Hiebert thus propose that the key to improving student learning is to
focus on teaching and the methods that teachers use in the classroom, rather than on the strengths and weaknesses of individual teachers.

Lesson study provides a framework for teachers to build professional learning communities in which they can consider the learning needs of students, discuss relevant research, and analyze classroom practice. Since 2005 the North regional cohort of teacher candidates in the Initial Teacher Education program at OISE has engaged in lesson study activities in classrooms with their associate teachers during the first practicum. Although most associate teachers have been introduced to the concept of lesson study through observing the activities of teacher candidates, none of the associate teachers in the cohort’s practicum schools had participated in a lesson study group. Consequently, this research project was designed to provide opportunity for associate teachers and teacher candidates to examine the benefits and challenges of this practice within a professional learning community, and with the aim of improving teaching and learning in mathematics.

The lessons developed for this project were delivered in two culturally diverse elementary school classrooms. The lesson at Elmlea Junior School was delivered in a grade one class with the participation of 24 students (ages 7 to 8). The lesson at Dixon Grove Junior Middle School was delivered in a grade six class with the participation of 28 students (ages 12 to 13). Four associate teachers and six teacher candidates participated in the study. Each of the associate teachers brought at least five years of teaching experience to the project. All of the teacher candidates were studying to enter the teaching profession for the first time.

**Stages of the Project**

**Introduction to the lesson study project**

In September 2007 thirteen research participants met with the project’s two coordinators at OISE for a half-day lesson study workshop. The participants included four associate teachers, three administrators, and six teacher candidates. The workshop began with an overview of *The Teaching Gap* (Stigler & Hiebert, 1999) and a discussion of its central arguments:

- Teaching and learning are culturally constructed activities that differ significantly among world regions;
- Mathematics instruction in Japan has a greater focus on rich mathematical problems, conceptual understanding, and recognizing connections among concepts, while North American instruction tends to place emphasis on teacher modelling and students engaged in repeated practice;
- Teachers in Japan engage in lesson study as a form of collaborative, research-informed professional learning.

The group viewed video footage of schooling in Japan to illustrate some of the cultural differences between teaching and learning in the participants’ schools and the four schools highlighted in the Japanese video. Following an overview of the future stages of the lesson study project, the associate teachers and teacher candidates met in school-based groups to discuss their focus for the project. Each group selected a grade level, considered the learning needs of their students, identified a research lesson focus, and discussed resources that they would bring to the lesson-planning stage.
Collaboration to develop the research lesson
Teacher candidates and associate teachers met in school-based groups later in October to share and discuss the resources and research they had brought with them to facilitate the development of their research lessons. The group members discussed lesson structure and content, planned the lesson, and identified an associate teacher who would deliver the research lesson. Each group also discussed and developed an observation protocol and determined what would be considered evidence of their students’ learning.

Lesson delivery and observation
Within two weeks of the planning meeting, each school group delivered and observed the research lesson according to the roles they had determined as a group. The project coordinators observed the lesson study participants and took notes to record the activity of the group.

The grade one lesson study group at Elmlea planned and delivered a lesson that aimed to help students develop their understanding of number. Their lesson plan included the following learning expectation: “Students will demonstrate, using concrete materials, the concept of conservation of number (focus on number 5)” (Ministry of Education, 2005, p. 33). The teacher delivering the lesson introduced the concept by displaying various groupings of three objects using the overhead projector. The students were then given an assortment of shapes and objects that they used in pairs to solve the problem, how many different ways can you show the number 5?

The grade six lesson study group at Dixon Grove developed and delivered a lesson that focused on enhancing student understanding of fractions. Their lesson plan learning expectation stated: Students will demonstrate an understanding of fractions and how to apply them to real-life situations by using their problem-solving skills (Ministry of Education, 2005). During the grade six lesson students engaged in a picture book read-aloud about sharing, worked in pairs on a graffiti brain storm poster activity to share their existing knowledge of fractions, and worked in pairs on a problem-solving activity to determine pizza toppings in keeping with the preferences of eight people who were going to share the pizza.

Research lesson debrief
Immediately following the delivery of the research lesson in each school, the project coordinators met with the lesson study group to debrief the activity. During the debriefing session they emphasized student engagement and learning, the strengths and challenges of the research lesson, the adjustments to the lesson plan that the delivering associate teacher had made prior to and during lesson delivery, and any suggestions for lesson revisions to enhance student learning.

Focus group discussion
In the final stage of the research project the two lesson study groups from Elmlea and Dixon Grove were reunited to debrief the lesson study project. In a focus group format, the participants responded to the following questions:

1. What are your general impressions of lesson study?
2. What are the benefits of lesson study? For teacher candidates? For associate teachers? For students? For teaching and learning in mathematics?
3. What are the challenges of lesson study?
4. How can lesson study contribute to the development of a professional learning community among teachers?
5. What, if any, role might lesson study play in your future work as a teacher?

Data Collection and Analysis
The discussions among teacher candidates and associate teachers were audiotaped during the collaborative planning, debriefing, and focus group stages of the project. The project coordinators took notes during these conversations to record some of what was said and to capture any non-verbal data that would not be recorded on the audiotape. During the discussions to plan the research lesson for each school, the project coordinators also tracked and recorded the participation of associate teachers and teacher candidates. To provide additional data at the conclusion of the project, all participants submitted a two-page written reflection of their lesson study experience, wherein they discussed their general responses to the activities of the project and commented on the benefits and challenges of lesson study collaboration among teacher candidates and associate teachers. The quotes provided in this report are drawn from the reflective papers. Due to the small sample size, quotes are demarked as originating from a teacher candidate or associate teacher to assure the anonymity of specific participants.

Benefits of lesson study collaboration
All of the project participants were enthusiastic about lesson study and believed that the lesson they had planned collaboratively was strengthened by the sharing of their knowledge of mathematical concepts and pedagogy, and by addressing the varied needs and interests of students. Following is a description of the key benefits that the participants identified.

1. In-depth discussion during the lesson planning
Participants were impressed by the quality of the informed and in-depth discussion that took place during the lesson-planning phase. They valued this opportunity to address the learning needs of students, deconstruct mathematical concepts, consider varied instructional approaches, and determine what constitutes evidence of student learning and engagement. The following passage is from a reflective paper submitted by a teacher candidate; it captures the depth of discussion among the group members while they planned the research lesson:

We decided on number sense and numeration for the unit, and the specific expectation was that the students would use concrete materials to demonstrate their understanding of the concept of conservation of numbers (which means that five counters represent the number five irrespective of how the counters are arranged, whether they are close, far apart, arranged in a circle, etc.). We discussed that we would like to use an overhead projector to stimulate and provoke student interest in the lesson. One of the things we discussed was the social aspect of the lesson, and we wanted to encourage the students to work cooperatively in groups and share ideas. With that in mind it was decided to pair students up, and we gave some thought to which pairs might work well together. We decided to start the lesson with a demonstration of the concept with the number three. After the demo the teacher was to challenge the children with their ideas on arrangements for number five. There was some discussion around
how many arrangements we should ask the students to show us. We decided to cut up strips of construction paper with three sections to each strip. The students would be asked to demonstrate three arrangements on the strips and those students who found it easy going could then request more strips to show their work on. In this way we felt that we could accommodate the students who were racing on with the task and wanting to try more arrangements, and at the same time keep the challenge simple enough with only three arrangements required so as not to frustrate other students. There was also some talk around whether we should use the same manipulatives with one uniform attribute (e.g., all green linking blocks) for all the students, or not. As our class was doing patterning with linking blocks, I thought that they might get stuck on sorting by colour instead of focusing on arrangements.

All of the project participants valued the collaboration in which they took part to research, consider, and plan the lesson. They commented that this was an enriching experience that improved not only the lesson at hand but also the ways in which they approached the task of lesson planning. One associate teacher commented,

Through this collective process of planning and problem solving there is a synergy that develops through contributing best practices and allowing for the opportunity to learn from others. Working as a group allowed us to view our planning from different perspectives and, in turn, I found that I became more analytical in all aspects of lesson preparation.

2. Focused observation and assessment of student learning

The teacher candidates and associate teachers affirmed that the opportunity for focused observation of student learning was beneficial not only for observing students’ responses to the lesson but also for facilitating insightful critique of the lesson’s effectiveness. Even the experienced teachers commented that focused observation of student engagement and learning as part of the lesson study process allowed for greater awareness of lesson effectiveness and enabled them to identify ways in which the lesson could be revised to promote deeper learning for students. According to one associate teacher,

It was also interesting to observe the students in the classroom when the lesson was being taught. This allowed us to see first-hand if the student was learning, motivated, or excited about the lesson. It also allowed us to see when part of the lesson did not grab their attention, or confused them and needed to be taught differently. In this sense, lesson study would allow the teachers to go back and “fine tune” the lesson to maximize learning and interest among the students.

Teacher candidates commented that the observation component of lesson study not only informed their insight into the lesson’s effectiveness but also provided an opportunity for a focused formative assessment of their students. One teacher candidate wrote,

I related it [focused observation] to the article I read on assessment [Black & Wiliam, 1998] and how more attention has to be given to what is actually going on inside the classroom or the “black box” in order for us to make informed decisions on ways we can improve understanding for students and how we assess them. By being given this opportunity, I feel that I was able
to see, through observing the students, what worked well or not so well during the lesson. I’m not so sure I would have been able to observe as much if I was the one delivering the lesson.

3. Shared critique of the lesson to consider ways to advance student learning
The teacher candidates were particularly enthusiastic about the debriefing stages of lesson study. They identified ways in which the shared reflection enhanced their awareness of student learning during lesson delivery, encouraged them to articulate their observations, and promoted a more critical consideration of the lesson’s effectiveness in advancing student learning. Following are the comments of two teacher candidates:

The debriefing that took place after the lesson was delivered was an excellent way for us to reflect as a group on the various observations we made of the students, what we thought worked well, what could be improved and how, and the process of lesson study itself. I believe this again reflects a step towards the standard of professional practice.

[Lesson study] has forced me to look more critically at how to design a lesson and how to use my observations of students to better understand what needs to be improved upon in a lesson and what worked well. Most important to me was the chance to see a lesson through the eyes of other individuals and the sharing of ideas which enables us to teach in ways that are inclusive to our students.

4. Improved content knowledge and teaching confidence
Teacher candidates and associate teachers suggested that lesson study collaboration strengthens knowledge of curriculum content and builds instructional confidence in less familiar subjects. They argued that there are benefits for both novice and experienced teachers. One teacher candidate felt that lesson study could be beneficial “especially to teachers who are not comfortable teaching the specific topic.” An associate teacher commented,

Overall I think lesson study is a fabulous idea. For teacher candidates, it enabled them to see team members working collaboratively and the sharing of great ideas among a team of teachers. Lesson study allows teachers to make stronger connections with their colleagues, and it improves the quality of lessons. We look beyond teaching the topic, but look at what the key ideas and goals are. For a teacher, such as myself, who is not strong in teaching science, lesson study would strengthen my skills and abilities to teach the subject. Not only would we have created a lesson, it would be an extremely strong lesson as it has come from the ideas of many different teachers.

5. Application of current research to improve teaching practice
The project participants noted that the lesson study process provided a structured and purposeful occasion to discuss research and to apply it to their practice as teachers. For example, one teacher candidate described the research-based contribution that teacher candidates made to the planning process in her group.

When collaborating on the lesson plan, it was clear to me that the teacher candidates in particular were using what they had learned in reading the NCTM principles and
The Teaching Gap to inform their decisions on what kind of tasks and activities should be implemented in the lesson. In fact, The Teaching Gap was brought up explicitly by many of the teacher candidates as we were designing the lessons. Key ideas were that the activities should allow the students to use their problem-solving skills and involve group work and individual work. We wanted a chance for the students to work cooperatively in pairs and activate their prior knowledge of what fractions look like and why we use them, without too much prompting from the teacher. It was critical for us to observe the kinds of problem skills they were using on their own, or in pairs, to solve each of the activities.

6. Increased capacity for incremental change and improved student learning

Associate teachers and teacher candidates described the capacity of lesson study to generate change within teaching and the teaching profession. They realized that this would occur as more teachers enter the profession with a genuine commitment to collaboration, building professional learning communities, and engaging in dialogue to consider and critique the effectiveness of instructional strategies. In this way the capacity for incremental change and improved student learning would increase within the system.

All of the teacher candidates in this study indicated that they would be committed to building on their lesson study experience when they became employed as teachers; this would happen by creating strong collaborative relationships with their colleagues and inviting them to engage in lesson study activities. The associate teachers hailed the enthusiasm of the teacher candidates and remarked that this enthusiasm, combined with their desire to improve, has potential to transform teaching practice. One associate teacher wrote,

Using lesson study allows teacher candidates to enter their first teaching assignments with a strong sense of the importance of teamwork among teaching colleagues. Many teachers work within their own room and neither do they share with their colleagues, nor do they learn from their colleagues. New teachers have a great opportunity to set a new standard that has often been forgotten, that even as teachers we must be continually learning.

The perspective of a teacher candidate is exemplified in the following:

There is no doubt in my mind that lesson study is a great way to bring the focus of learning back to where it should be, on the students. Also among its many positives is that it is a great way for the teaching fraternity to learn to lean on and draw strength from one another. Lesson study is more of a long-term strategy rather than a quick-fix solution and we need patience, persistence, and support to bring about the change.

7. Modelling collaboration and problem solving for students

While many teachers encourage cooperation and collaboration among their students, there are few examples of teacher collaboration that are salient for students and also serve to show adults as cooperative learners. One associate teacher commented, “As teachers we must continually be modelling for our students, and there is no better way to model cooperation and problem solving than to work together with our colleagues, to share ideas, to listen to each other, and to take responsibility as a productive contributor to the process.”
Challenges of lesson study collaboration

Although the participants in this study were overwhelmingly enthusiastic about lesson study, they identified two significant challenges: problems of time and workload and issues of power imbalance.

1. Time and workload

All project participants were concerned that the current structure of a teacher’s workday makes it difficult to find time for the authentic collaboration that is required for lesson study. Demanding teacher timetables, including co-curricular leadership, ongoing school improvement initiatives, committee meetings, and administrative tasks, in addition to classroom teaching responsibilities, allow limited time for lesson study collaborations. Current provincial funding for various school improvement and professional development initiatives has provided for occasional teachers to release teachers from their classrooms in order to focus on professional learning during their workday. However, the teachers in this project argued that too much time away from teaching their students increased their concerns about student learning and addressing the demands of the curriculum. One teacher candidate stated,

I believe most of us felt lesson study was a great tool for teachers to use but were a little unsure of how it could be implemented in schools so that teachers don’t view it as something that overwhelms them in terms of time and workload.

The issue of time and workload is even clearer for teachers already working in the school system. According to one associate teacher, “To be able to implement something such as lesson study in the Ontario school system is unrealistic at this point. To be able to meet for lesson study seems to be out of reach unless time is allotted into our schedules.”

Although teachers appreciate the professional development time that is granted, one associate teacher said, “There is also the problem of being out of their own classroom too frequently, which results in teachers feeling frustrated about accomplishing all that is set out for them to do within the classroom.”

One of the school groups attempted to circumvent time challenges by delegating lesson planning and preparation tasks to individual group members. The group intended to reconvene to review and revise their lesson plan prior to its implementation, but unanticipated changes in teaching schedules and last-minute meetings made it impossible for the group to meet again before the lesson was delivered. For these group members, the delegation of tasks resulted in a less than ideal collaboration and a sense that some aspects of the lesson lacked shared ownership. One teacher candidate commented as follows:

After reflecting, we also saw that it was a disadvantage in our planning to break the lesson planning into individual tasks for people to complete. When we were unable to meet again as a team, it meant that we were not all on the same page when the lesson was delivered. Many of the improvements that could be made to the lesson might have been smoothed out before the delivery of the lesson, if we had discussed it all as a team.
2. Power imbalance between teacher candidates and associate teachers

Several teacher candidates suggested that lesson study collaboration with associate teachers might be problematic in some circumstances during the practicum because of the power imbalance between the teacher candidates and the associate teachers, who evaluate their practicum and serve as essential references for their future employment. Some argued that teacher candidates might lack confidence to contribute their ideas and feedback throughout the lesson study process. They felt that others might have sufficient confidence but lack trust in the relationship with the associate teacher; they might subsequently limit their participation, fearing that their comments could be considered as criticism or indications of disrespect for the knowledge and experience of their associate teacher. One teacher candidate described this challenge as follows:

The dynamics of planning a lesson with two experienced teachers who are confident and vocal about their teaching styles and my being in the capacity of a student teacher who was there to learn, were important for me, and as such, the two associate teachers dominated the preliminary planning process. In the back of my mind was the thought that we were eventually to be assessed by our associate teachers and we might benefit from not rocking the boat. Also a contributing factor was my cultural background. I was raised in a culture that values experience, age, and status (socio-economic or official) etc., and I found it quite difficult to voice my opinion or raise doubts as that would be rude … This may be difficult to understand, but it was the reality of my situation. I think that in future such studies might benefit more when some consideration is accorded to the personalities of the participants or to their cultural backgrounds.

Concerns regarding the power imbalance and cultural differences between teacher candidates and associate teachers may have contributed to an observation the project coordinators made; most of the associate teacher dialogue during lesson planning constituted statements, while almost all of the teacher candidate contributions were phrased as questions.

For example, during one 20-minute period of collaboration among teacher candidates and associate teachers, the project coordinators observed 49 incidents of statements by associate teachers. This incident rate contrasted sharply to seven incidents of statements by teacher candidates. During this same observation period, both groups posed questions at a similar rate; associate teachers asked 15 questions and teacher candidates posed 14 questions.

Impact

Research studies suggest that lesson study builds professional learning communities, improves teaching, enhances student learning, and promotes ongoing reflective professional practice (Lewis et al., 2006; Stigler & Hiebert, 1999). The findings of this project correspond with the results of these research studies. Students in the lesson study demonstration classes had the opportunity to learn mathematics through their engagement with lessons that were crafted by a team of research-informed professionals. For teacher candidates and associate teachers, the lesson study process enabled them to develop and share their teaching knowledge and skills through a number of research-based approaches to mathematics instruction and assessment. Thus, an opportunity occurred for teacher
candidates to collaborate with each other and with associate teachers as part of a professional learning community with the aim to deepen their understanding of ongoing professional reflection in, of, and for learning and teaching. While it is difficult to measure improved student learning as a result of this project's single-lesson focus, North American researchers have studied the effects of lesson study on student learning where teachers have sustained their engagement in the process for more than two years, and the researchers have found statistically significant increased student achievement on standardized measures (Lewis et al., 2006).

Through this project, associate teachers and teacher candidates were able to engage in, build on, and support the professional learning communities that are being created as part of Ontario schools' strategic improvement plans to improve the teaching and learning of mathematics.

The participants in this project were enthusiastic about the lesson study experience and indicated that they look forward to similar opportunities for collaborative learning and professional development in the future. One of the participating associate teachers said,

Lesson studies provide the opportunity to continue to improve the math lessons we teach our students, and as a teacher, I hope that I will have the opportunity to do more of this collaborative work. Then I can always keep the focus on improving my teaching, so that my students are improving their academic and social success.

For some project participants, the experiences of collaboration, focused observation, and debriefing brought about a new respect for the knowledge, skills, and insights of their colleagues. As articulated by one associate teacher, the recognition that everyone brings something of value to collaborative efforts is accompanied by the acknowledgement that teachers can learn from each other.

Teachers come to school every day bringing a variety of experiences, an assortment of professional development, and a grab bag full of creative ideas. As teachers we live continuous learning, or at least we should in order to be good teachers. What good is it to keep everything to ourselves? The more that we share, the more that we grow. It's a vital element of being an effective teacher. Lesson study has taught me that we all have something valuable to contribute, regardless of our experience, to a process that enriches the quality of learning for the children that we reach each day. Not only do I have something to contribute but I also have a lot to learn.

Implications for Teacher Education

This project focused on the collaborative nature of lesson study—with its aim to improve teaching practices through the observation and assessment of student learning—and on research-informed practice. Both aspects of the project are aligned with priorities of OISE's Initial Teacher Education program that are related to faculty collaboration and school/field/university partnerships, teaching excellence, and research-informed practice (Rolheiser, 2008). In their recent article, Hiebert, Morris, Berk, & Jansen (2007) argue that the primary aim of teacher education programs should be to prepare teachers to learn from teaching and to support the development of their skills to “(a) set learning goals for students; (b) assess whether the goals are being achieved during the lesson; (c) specify
hypotheses for why the lesson did or did not work well; and (d) use the hypotheses to revise the lesson” (p. 49). Hiebert et al. acknowledge that many teacher candidates and practising teachers engage in some degree of informal and intuitive reflection but argue that there is a need for deeper, more intentional, and systematic analysis of cause-effect relationships in teaching and learning. This project provided space for such reflection among associate teachers and teacher candidates to promote the teaching and learning of mathematics.

Practical Applications
The findings of this project suggest that participation in lesson study collaboration promotes a sense of increased confidence and efficacy among teachers. All participants were enthusiastic about the process and their own professional development as a result. Given administrative support and an adequate amount of time during the school day, each of the associate teachers and teacher candidates would continue lesson study collaboration with colleagues. Most significantly, the participants suggested that collaborative planning, focused observation of student learning, and reflective dialogue promote increased knowledge and confidence in teaching the subject content and prompt more focused consideration of student needs throughout the lesson-planning process. Their experience suggests that if teachers are provided the time for lesson study collaboration as part of their ongoing professional development, they will enjoy a sense of accomplishment in knowing that they are part of a professional learning community that is focused on improving student learning.

Next Steps
As already indicated, most research on lesson study in North America has focused on in-service teachers in school settings. There is a need for more research studies that focus on lesson study collaborations among teacher candidates within teacher education programs and with associate teachers in schools. In addition, there is need for studies that examine lesson study and the teaching of mathematics in high school settings in Ontario. Other researchers may also want to compare and contrast lesson study collaborations in concurrent and consecutive teacher education programs.

Considering the enthusiasm of the participants in this project and their conviction that lesson study is a powerful medium to improve teaching and learning, future research should examine strategies for incorporating lesson study as a professional development approach in schools. Strategies to develop school timetables that provide opportunities for job-embedded professional development are most needed to establish lesson study as a vehicle for the development and sustainability of authentic and focused professional learning communities among teachers. Many elementary school timetables are currently structured to provide an opportunity for teachers to meet weekly in professional learning communities. Teachers often use this time to meet in grade groups to discuss long-range plans, share resources for unit planning, and moderate evaluation and reporting strategies. Training and practice in lesson study might provide an effective accompaniment to existing collaboration among teachers.
References


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—Amanda-Mae Cooper
MEd student

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