An Interdisciplinary Approach to Curriculum in the Middle Years: Summative Evaluation of the IMYM *Climate Change* Pilot Study

Cheryl Prokopanko
Assistant Coordinator and Project Leader
Manitoba Education, Citizenship and Youth
Distance Learning and Information Technologies Unit (DLITU)
E-220 1970 Ness Avenue
Winnipeg, Manitoba R3J 0Y9
Canada
Telephone: (204) 945-6435
Email: cprokopank@gov.mb.ca

Karen Fiege
Calgary, Alberta
Canada
Email: karenfiege@shaw.ca

Abstract: This paper reports on the Interdisciplinary Middle Years Multimedia (IMYM) *Climate Change* pilot study carried out by Manitoba Education, Citizenship and Youth (MECY), Province of Manitoba, over the 2003-2004 school year. Fifteen grade 5 pilot teachers were selected from across the province. Participants were provided with various resources, face-to-face professional learning sessions, and an online learning community. This pilot study was based on the IMYM model which blends an interdisciplinary constructivist approach with the integration of Information and Communication Technology (ICT) in an effort to achieve curricular outcomes. Results were derived from the qualitative data of the IMYM pilot teachers' online reflection journals, threaded discussions and feedback as well as quantitative data from exit slips and rubrics. The pilot study was deemed a success and its findings are relevant to those interested in teacher training, and the integration of ICT into curriculum, teaching, learning, and assessment.

Introduction

The IMYM (Interdisciplinary Middle Years Multimedia) *Climate Change* pilot study was undertaken in response to the need of Manitoba Education, Citizenship and Youth (MECY) to integrate the concept of Technology as a Foundation Skill (TFS) throughout Grade 5 curricula and classrooms. The purposes of the pilot study were to field test and revise the *Climate Change* unit, increase student knowledge of climate change, explore promising classroom practices in ICT integration, influence changes in teaching style through the IMYM model, and experiment with how an online learning community can support teacher collaboration and reflection.

The IMYM *Climate Change* pilot study focuses on the implementation of the *Climate Change* interdisciplinary unit (MECY 2005), which consists of a sequence of learning experiences (LEs). These LEs include Ongoing Learning Experiences (OLEs), Information and Communication Technology learning experiences (ICTs), and three modules of content-related learning experiences (Modules 1-3).

Each OLE provides strategies for students to use ICT in daily, weekly, or monthly tasks throughout the school year. For example, OLE.2, titled *Daily Edit*, encourages learners to use the spell check, grammar check, and thesaurus features of their word processor to edit and revise their drafts as part of the writing process.

IMYM teachers introduce the ICT learning experiences as required and then continue to integrate them with curricular learning outcomes throughout the school year. For example, ICT.6 *Inspired!* introduces learners to the use of concept mapping software to organize and categorize research information. In this way, IMYM teachers can meet the needs of their students while using the ICT available to them by choosing, modifying, and then introducing appropriate learning experiences.

The three modules of content-related LEs present a structure to guide students as they look at the 'big picture', ask essential questions about climate change - what it is, how it affects us, and what we can do about it, and raise awareness about climate change in the school and local community.

IMYM Model

Climate Change is one of five IMYM interdisciplinary units, and all units derive their theoretical framework from the IMYM model. The IMYM model exemplifies four broad beliefs about teaching and learning (MECY 2004a).

- meaning making is enabled through a constructivist and collaborative learning environment [integration of curriculum] (Jonassen 1996, 2000)
- deep understanding develops when multiple disciplines are blended around a transferable concept [interdisciplinary learning]
- motivation increases when learning occurs in a real world context using ICT as a learning tool [integration of ICT] (Bitner & Bitner 2002)
- gradual release of responsibility to learners requires a shift in the role of the teacher from disseminator of information to facilitator of active learning [model of explicit instruction]

The IMYM model draws upon three distinct areas for its structure (Fig. 1). First, it aggregates content from core curricula related to an interdisciplinary concept such as climate change. Second, it relies upon the creation and maintenance of a constructivist learning environment within the classroom. Third, it draws upon the use of authentic assessment of both process and product, by encouraging three dimensions of assessment: *for learning* [formative], *as learning* [reflective], and *of learning* [summative] (Telus Learning Connection 2002). The IMYM model is promoted by MECY through face-to-face professional learning sessions, online professional learning resources, videos of IMYM classrooms, website resources, and professional learning centres on CD-ROM (MECY 2004b).

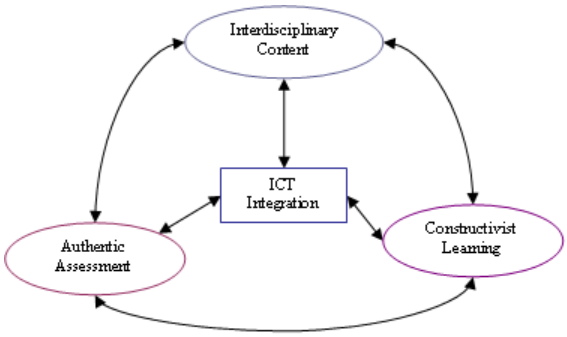

Figure 1: Representation of the IMYM Model

The IMYM model began "in response to the identification of Technology as a Foundation Skill [TFS] area…[that needed] to be integrated throughout all Kindergarten to Senior 4 curricula. The purpose of [the IMYM model] is to develop an effective instructional model that supports integration of Information and Communication Technology [ICT] with curriculum through an interdisciplinary approach to instruction at each grade level of the Middle Years" (MECY 2004c). There are currently over one hundred schools implementing the IMYM model throughout the province of Manitoba.

IMYM *Climate Change* Pilot Study Overview

The process of selecting teachers for the IMYM *Climate Change* pilot study was initiated by sending information and an application package via the IMYM listserv, an electronic community of IMYM teachers who share IMYM model implementation information, experience, and reflections, as well as the Computer Education Coordinators of Manitoba listserv. To qualify for the pilot study, interested teachers needed to teach at least two core subjects to Grade 5 students in the 2003-2004 school year. They also required experience with interdisciplinary and differentiated instruction, experience with collaborative learning strategies, and access to at least three computers situated within their classroom and connected to the Internet. Furthermore, applicants had to express willingness to integrate ICT into the classroom, implement constructivist and active learning strategies, follow a middle years

approach with Grade 5-8 learners, and share new learning with other teachers through peer mentoring and collaboration.

To complete the application process, teachers met four additional requirements in and above the professional and personal qualifications. Firstly, applicants provided a letter of administrative support from their school, since administrative support was found to be a critical component in the success of previous IMYM pilot studies. Secondly, applicants completed self-assessment rubrics on ICT literacy and on pedagogical skills in integrating ICT with curriculum and classroom practice. Thirdly, outlined expectations of pilot teachers were acknowledged by each applicant. For the duration of the pilot study, every pilot teacher was expected to contribute to the IMYM Online Learning Community; **e**xperiment with the IMYM model within the *Climate Change* learning experiences; collaborate with and support other pilot teachers; **s**hare learner samples and digital classroom photos; reflect on their own learning, student learning, professional relationships, and classroom changes; and provide feedback by completing online exit slips at the end of each *Climate Change* learning experience. Finally, each prospective IMYM pilot teacher wrote a short personal narrative about his/her understanding of the IMYM model and what he/she was already doing in the classroom to help students use ICT to learn.

> *I am currently teaching grade 5...In the past I have also helped other teachers [in my school] learn the skills needed to use the computer as a tool in the classroom to enhance learning.*
>
> *This year, I will be the only Grade 5 teacher piloting this project in [our school] division. In the past, I have participated in several of the [school]division's initiatives to integrate technology in the classroom. I have found that students learn by doing and that teaching the skills students need in an authentic environment is by far the best way for them to learn. I have a student teacher this year who will be, like me, learning about the IMYM model and about the Climate Change interdisciplinary unit.* (Teacher narrative, IMYM Pilot application, June 14, 2003)

The rationale behind these additional requirements was to ensure that applicants understood their commitment and the responsibilities involved in participating as IMYM pilot teachers. These requirements also provided opportunities to determine each teacher's interest in action research intended to improve the learning process and the integration of ICT with curriculum using the IMYM model.

The IMYM project team selected pilot teachers based on regional representation, administrator references, commitment to participate fully in the pilot study, and teaching expertise as outlined in their application package. The team assessed each applicant on expressed interest in interdisciplinary instruction and classroom innovation. However, the selection criteria did not require a high level of teacher ICT literacy because MECY promotes the IMYM model as one way of increasing ICT literacy. Fifteen pilot teachers participated in the pilot study, representing remote, rural, urban, and inner-city schools throughout Manitoba.

The IMYM *Climate Change* pilot teachers participated in a total of four days of MECY-sponsored face-to-face professional learning in August 2003 and February 2004. The IMYM project team used data from the pilot teacher self-assessment rubrics, in addition to their own expertise in providing professional learning, to design these IMYM *Climate Change* professional learning sessions. Each professional learning task correlated directly with the learning experiences that pilot teachers were preparing to do with their own students in the *Climate Change* interdisciplinary unit. This correlation provided pilot teachers with opportunities to learn about both the IMYM model, as well as the various ICT integration strategies they would be employing with their own students throughout the pilot study.

> *There is a lot of information to be learned in a short time frame. I see one of my strengths as being able to utilize and integrate technology within the curriculum once I have built up a certain level of skill and comfort. I also enjoy collaborating with other people. Although it will be a challenge to learn to use all the tools that will be presented by the end of this session, I'd like to think that I'll continue to be a lifelong learner as far as ICT is concerned.* (Threaded discussion, IMYM Online Learning Community, August 25, 2003)

Each professional learning session was designed around four themes 1) the draft content of the IMYM *Climate Change* interdisciplinary unit 2) the methodology of interdisciplinary and collaborative instruction and assessment in the IMYM model 3) the pedagogy and management of using ICT to enable learning in the IMYM classroom and 4) the functionality of the IMYM Online Learning Community as a pilot environment. To address each of these themes, pilot teachers engaged in a variety of interrelated and collaborative tasks. For example, the IMYM pilot teachers participated in a group brainstorming session using concept mapping software. This task prepared them to

create their individual electronic concept maps about how the IMYM model might look, feel, and sound within their own classrooms. This task assisted in strengthening the ICT skill of concept mapping and was also important for post-pilot data analysis, as it was repeated for comparison at the follow-up session in February, 2004.

The face-to-face professional learning sessions helped to establish an IMYM community of learners, fostering increased collaboration and peer support among the pilot teachers through the duration of the pilot study (Brown & Campione 1994; Scardamalia & Bereiter 1994). This ongoing collaboration and peer support continued through the IMYM Online Learning Community (MECY 2004d), a learning environment created using WebCT learning management software. All online content, as well as the structure of the online learning community, was designed to accommodate either low or high bandwidth. Therefore, regardless of the level of Internet connectivity, pilot teachers were easily able to post and share student samples and resources. In this way, student samples and resources were easily posted and shared by the pilot teachers regardless of the level of Internet connectivity in their classroom.

During each day of professional learning, pilot teachers were invited to reflect on their experiences in an online journal, both for immediate feedback to the IMYM development team, and for metacognitive purposes. It was expected that pilot teachers would elaborate on their reflections throughout the pilot study.

> *The Climate Change interdisciplinary unit is very interesting and I can't wait to try it out! I'm pleased with today's session because I have learned a lot. Although I'm familiar with the IMYM model, there are many aspects that are new to me. I'm still learning. I find this group to be open to sharing and the teachers seem to be very co-operative. I can't wait to use the IMYM Online Learning Community. I have not been teaching this way for years (change of school and the rotation system made it harder to use the IMYM model). I am a bit rusty in some areas but I have learned a lot...things are coming back. I am willing to help out any way that I can.* (Teacher online learning journal, August 26, 2003)

Results

Substantial amounts of qualitative and quantitative data were collected during the IMYM *Climate Change* pilot study. Data were collected using various instruments: pilot teachers' self-assessment rubrics, exit slips completed at each professional learning session, online feedback forms on each classroom-based *Climate Change* learning experience, threaded discussions and online reflection journals kept throughout the pilot study, uploaded student samples and classroom photos, classroom observations by the project leader, and summative feedback and a gallery walk at the follow-up professional learning session in February 2004.

Eleven of the fifteen pilot teachers completed the two rubrics, *Self-Assessment of ICT literacy* and *Self-Assessment of Pedagogical Skill in Integrating ICT with Curriculum and Classroom Practice* (MECY 2004e), in both June 2003 and February 2004. Comparison of the self-assessment data indicated a general increase in their overall ICT and pedagogical integration skills. However, there was considerable gain in areas of focus, such as an increase in skills in digital imaging using the digital camera the pilot teachers received as participants in the pilot study, as well as an increase in Internet searching skills using the classroom computers provided by their schools (Fig 2). Figure 2 illustrates a sample of one of the 27 graphical representations of the comparisons of self-assessment data provided by the pilot teachers in August 2003 and February 2004. The sample in Figure 2 represents digital imaging skills. Teachers choosing the *Exemplary Stage* agreed with the statement, "I integrate my own digital images into my classroom presentations and/or on my classroom website. I have taught my students how to take digital images and use them in their own word processed documents, concept maps, multimedia presentations and/or webpages". Teachers choosing the *Accomplished Stage* agreed with the statement, "I can alter digital images by cropping, rotating, and resizing. I import my own original digital images into word processed documents, concept maps, multimedia presentations, and/or webpages". Teachers choosing the *Developing Stage* agreed with the statement, "I understand how to take photos with a digital camera. I can connect a digital camera to a computer to transfer my own digital images. Teachers choosing the *Beginning Stage* teachers agreed with the statement, "I do not yet use a digital camera".

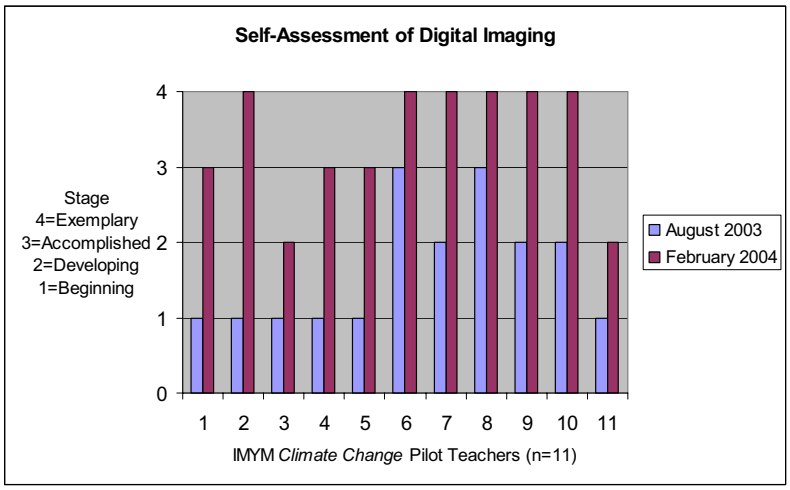

Figure 2: IMYM *Climate Change* Pilot Teachers' Self-Assessment of Digital Imaging Skills

The reflective online journals that each pilot teacher maintained provided rich data for the pilot study. Teachers were asked to use their online learning journals to reflect on their own learning, student learning, evolving relationships with students and colleagues, and how their classroom practice changed.

> *I have definitely discovered my abilities as well as my limitations. However, I have to decide what it is that I want to accomplish and then set time limits. I cannot spend too much of my own time at work or I get worn out. To keep motivated and positive for my students I need to be rested and content outside of the school day. I realize how easy it is to get involved in technology and to love it! I feel much more comfortable with it and have even offered to teach other staff how to use technology in the classroom. This pilot has been a very positive growth experience for me. I do feel that I grew from the experience… and I very much appreciate those that were capable of helping out the rest of us!* (Teacher online learning journal, November 2003)

> *The IMYM model is a very collaborative and hands on model. As a result, my classroom has become a very collaborative and hands on place! The walls are full of words, questions and visuals which reflect our learning. Students are coming and going since we use the computer lab, the library as well as the classroom to work in. It has given me a chance to work with the students who are having difficulties and to put strategies in place to help them. My classroom has become a learning lab. Teachers, students, parents, administrators and the community are all involved in the sharing and celebrating our ideas and knowledge based on good sound research and exploration.* (Teacher online learning journal, January 2004)

At the follow-up meeting in February, 2004, the IMYM pilot teachers shared their successes, challenges and evidence of student learning about climate change. They also recommended which OLE, ICT, and Module learning experiences should be kept within the interdisciplinary unit and which should be eliminated or modified for future use. The IMYM pilot teachers decided to keep the majority of OLEs and ICTs with the exception of ICT.10 *Finding It* and ICT.11 *Making It,* both of which involved web authoring. It was felt by the majority of the IMYM pilot teachers that Grade 5 students had not yet developed the technical skills needed to create a website. The pilot teachers also decided to remove the *Big Picture* from Module 1 and to make it into a separate component, due to the time needed to introduce it to the students. In general, the number of LEs in each module was reduced and the culminating task was changed from a *Climate Change* Awareness Week to a *Climate Change* Awareness Event to allow for more flexibility to meet local conditions.

As already noted, there was a substantial amount of data collected during this study. Data were analyzed by: finding themes in the threaded discussions, online learning journals and classroom observations; by comparing pre and post self-assessments; and by examining student samples and classroom photos. The data provide evidence that pilot teachers experienced the following

- change in teaching styles

- altered perceptions regarding their role as a teacher
- increased job satisfaction
- newly acquired teaching and ICT integration skills
- increased technical knowledge and skills
- increased teacher knowledge about climate change
- increased student knowledge about climate change
- improved classroom management skills

Conclusion

Based on analysis of the qualitative and quantitative data collected from this study, the IMYM *Climate Change* pilot study demonstrates a positive impact on both teaching styles and learning outcomes. With only minor revisions required for future years, interested teachers in Manitoba can look forward to participating within the IMYM Online Learning Community and to implementing the *Climate Change* interdisciplinary unit. The key findings of this pilot study demonstrate that ICT was effectively integrated into curriculum and classroom practice.

References

Bitner, N. & Bitner, J. (2002). Integrating technology into the classroom: Eight keys to success. *Journal of Technology and Teacher Education, 10*(1), 95-100.

Brown, A. L., & Campione, J. C. (1994). *Guided discovery in a community of learners*. Cambridge, MA: MIT Press.

Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

- (2000). Computers as mindtools for schools: Engaging critical thinking (2nd ed.). Upper Saddle River, NJ: Merrill-Prentice Hall.

Manitoba Education, Citizenship and Youth (MECY) & Interdisciplinary Middle Years Multimedia (IMYM). (2005). *Climate Change Interdisciplinary Unit*. Retrieved January 15, 2005 from: http://www.edu.gov.mb.ca/ks4/tech/imym/5/index.html

- (2004a). *Research Results: evaluation report for the Climate Change IMYM pilot*. Retrieved April 10, 2004 from: http://www.edu.gov.mb.ca/ks4/tech/imym/results/climatechange.html
- (2004b). *IMYM model learning centres*. Retrieved September 10, 2004 from: http://www.edu.gov.mb.ca/ks4/tech/imym/workshops/lrngctr/index.html
- (2004c). *Pilot overview*. Retrieved April 4, 2004 from: http://www.edu.gov.mb.ca/ks4/tech/imym/pilot/ovrview.html
- (2004d). *IMYM online learning community*. Retrieved June 15, 2004 from: http://percival.merlin.mb.ca:8900/webct/public/home.pl
- (2004e). *Rubrics*. Retrieved December 15, 2004 from: http://www.edu.gov.mb.ca/ks4/tech/imym/resources/index.html
- (2004f). *FAQs (Frequently Asked Questions)*. Retrieved March 16, 2004 from: http://www.edu.gov.mb.ca/ks4/tech/imym/faqs/imym-model.html

Scardamalia, M. & Bereiter, C. (1994). Computer support for knowledge-building communities. *The Journal of the Learning Sciences. 3*(3), 265-283.

Telus Learning Connection (Telus2Learn). (2004). *Assessment in a collaborative classroom*. Retrieved May 02, 2004 from: http://www.2learn.ca/projects/together/classroom.html

Acknowledgements

The authors of this report would like to acknowledge the pilot teachers who participated in the IMYM *Climate Change* pilot study, their students, Manitoba Education, Citizenship and Youth, and the financial support of the Government of Canada, Natural Resources Canada, Climate Change Initiative.