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Reaching Across Narrative Space: Re-interpreting One Teacher's Experience with Technology

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Abstract

In this paper, the authors investigate one teacher's utilization of Information and Communication Technologies (ICT) by drawing context from two of his life-stories: one that he interprets as "ruin" and the other "success." Methodologically grounded in narrative inquiry, this paper contains excerpts from the teacher's authentic narratives and their interpretation from the perspective of information systems research, known as the social process model. The findings emphasize that with the dialogic involvement of educational researchers, it is possible to reach a deeper understanding of the events that influence the teacher's experience with technology. Such synergistic alliances amongst educational researchers and teachers are key for detecting and overcoming the linguistic and operational barriers that exist between ICT theorists and practitioners.

How best can we support the work of K-12 teachers so that they can become empowered, informed users [of computers], and creators of interactive, curricular tools? (Bull, Bell & Kajder, 2003, p. 72)

This paper revolves around the question posed by Bull, Bell, and Kajder (2003) and its presupposition that teachers often do not feel adequately prepared to implement and evaluate Information and Communication Technologies (ICT) employed in their classroom pedagogy (Hardy, 2003; Hite, 2005). We advocate that teachers and educational researchers establish partnerships that will help them overcome challenges that Goodyear, de Laat, and Lally (2006) see in linguistic (i.e., shared language and common ground) and operational barriers that exist between practitioners and theorists).

"Operational barriers" are brought about with the predominance of "good practice" narratives of technology use (Dressman, 2000, p. 50). According to Dressman, the authors of these narratives do not describe the details and complexities of what happens, but rather reveal only the principles that they espouse. Similarly problematic is the focus of theorists on practitioners'

narratives with positive endings, the so-called "Hollywood plots" (Connelly & Clandinin, 1990); as well as their tendency to apply the process of "narrative smoothing" onto teachers' accounts with technology, such that it distorts the reality (Hoshmand, 2005; Spence, 1986). In order to avoid such biases and help achieve a more comprehensive understanding amongst educational theorists and practitioners, we intentionally highlight moments of confusion and puzzlement, including disenchantment with the technology, so as to provide a rich account of moments to "embrace and interrogate," as coined by Fecho and Allen (2003, p. 3). By so doing, we strive to answer the main research question driving this work: "How are the theory and practice of ICT implementation in schools connected?"

This paper is organized in the following way: The first section deals with the use of technology by teachers and examines a 5-stage model of technology adoption, as well as research indicating that most technology integration fails at Stage 2. It also sets the stage for differentiation between teachers' perceptions of and the realities of effective technology use. Two stories from practice that follow—one of ruin, the other of success, are analyzed from the perspective of the *social process model of user–teacher relationships* (based on Newman & Robey, 1992; also in Adomavicius, Bockstedt, Gupta, & Kauffman, 2008). The paper concludes with further recommendations for overcoming barriers between practitioners and theorists.

What Is Involved in Teachers' Technology Adoption?

According to Hooper and Rieber (1999) and Kenton (2005), the full potential of any educational technology will be realized only after teachers progress through the following five developmental phases: (1) *familiarization* with technology, (2) *utilization* of technology in the classroom, (3) *integration*—a conscious decision to designate certain tasks and responsibilities to technology, (4) *reconceptualization* of the teacher's role as the scaffolder and facilitator of the students' meaning- making process, and (5) *evolution*—the realization that the educational system must continue to evolve and adapt to remain effective. Most often, however, teachers do not progress past the second stage of utilization. Hooper and Rieber's perception is that teachers become prematurely satisfied with their limited use of technology and thus, at the first sign of difficulty, reject further technology implementation. However, the reality of ICT usage (i.e., what is available, how it works), especially from the point of a teacher-practitioner, appears to be more complex. For example, the technological innovation may deviate too much from set school values and/or prior educational teacher practice; it may need too many new technologies; or it may require involvement of people or technologies that are "beyond control of the teacher" (Zhao, Pugh, Sheldon, & Byers, 2002, p. 501-502).

At this point, one should bear in mind the premise of Ertmer et al. (1999) that teachers frequently do not readily assimilate educational technologies. Effective change in technology adoption amongst teachers must be encouraged by helping teachers to overcome certain external (first-order) barriers to change: limited access to software and hardware; lack of preparation time; and a corresponding lack of institutional support. Internal (second-order) barriers to change correspond to the beliefs teachers have about teaching, computer technology, and

educational change. According to Ertmer et al., first-order changes occur when teachers start using an innovation more effectively, even though their underlying beliefs about current teaching practice may remain unchanged. Only as teachers' beliefs regarding ICT use develop and change, can it be said that the teachers achieve a qualitative shift through identified second-order changes to the extent necessary for technology innovation to become practice (Fullan & Stiegelbauer, 1991). Ertmer (2005) further emphasizes the need for both understanding and addressing teachers' beliefs as a necessary condition to increase teachers' technology usage and skills.

To methodologically illustrate this process of meaning-making, we use one teacher's narratives as primary data, made possible through the process of narrative inquiry. These narratives, provided by the teacher, were based upon his previously published stories (Pugh, 2007; 2005) and documents pertaining to events of interest. This process of retelling these legacy stories fits "another important aspect of sharing stories that inform and connect us across time and place, and that involves reconstructing stories from the past in the light of present knowledge" (Shields, 2005, p.180). Based upon some personal (i.e., memos and diaries) and official materials (i.e., produced by school for record-keeping purposes), these narratives equate to "data rich in description" (Bogdan & Biklen, 2003, p. 58).

The next section of this paper provides examples of teacher ICT practice-related transformation through two stories. Stories of ruin are accounts of disasters surrounding the use of ICT within the school setting. If left unscrutinized, the impact of such narratives may be a key factor in preventing teachers from implementing ICT. Success stories, on the other hand, mostly describe achieved learning opportunities. If such "good practice" narratives, in Dressman's (2000) sense, are brought forward together with the less positive accounts with ICT, they may act as forerunners of future technological advancement within the educational environment. Therefore, we propose that both types of narratives should be recorded and interrogated with the purpose of mitigating the mentioned pitfalls of one-sided narratives.

The First Encounter of the Teacher–Storyteller with the Researchers

The researchers got acquainted with Tom (pseudonym) during one of the professional development conferences. He described some of the ICT work that he was doing in his school board, it became apparent that he was seeking an opportunity to analyze current practice. At that time, the researchers were looking to partner with teachers in order to explore some of their computer technology-related ideas. Both parties started a collaborative partnership, now in its second year. Since then, Tom has revealed that he occasionally writes stories about his encounters with technology and action research—he calls them "school memoires." The researchers saw this opportunity to work with Tom as a way to "reach across the narrative space" (Clandinin & Connelly, 2004) and they proposed the use of these narratives for the purpose of "(re)interpreting [Tom's] lived experience" (Shields, 2005, p. 179) with ICT.

About Tom, the teacher/storyteller

This teacher has taught in all divisions (Grades JK-10). He has been teaching for 20 years and has received basic training in the educational use of computer technology. He had completed a master's degree in education. Tom enjoys taking a leadership role in activities involving technology and can be described as forward-thinking and daring.

Methodology

The methodological approach of this paper is to take each of the two narratives and apply a theory-grounded interpretation from the perspective of the *social process model of user–teacher relationships*, based upon the *social process model of user–analyst relationships* of Newman and Robey (1992). Each interpretation was made by one researcher and then checked by the other. After consensus was reached, the interpretations were then sent to the teacher to be checked for accuracy (Guba & Lincoln, 1981). The teacher provided his comments and confirmed the accuracy and the completeness of the elements captured from his stories.

      One of the reasons for choosing the social process model approach, more commonly applied to information systems research, was to present one teacher's encounters with ICT as a sequence of events over time. By doing so, it became increasingly clear how and why particular outcomes were reached (Adomavicius, Bockstedt, Gupta, & Kauffman, 2008; Mohr, 1982), given the affordances and obstacles in the teacher's adoption of ICT. This model thus allowed for an analysis and visual representation of narratives describing the teacher's first-hand encounters with ICT, including a means of determining the occurrences of (a) critical moments of abrupt change, whether positive or negative and (b) periods of stability. This approach was deemed appropriate as the narratives included the teacher's points of view and beliefs.

      For each narrative, the *social process model of user–teacher relationships* was developed by first defining *antecedent conditions* that preceded a sequence of events categorized as either episodes or encounters. An *episode* is defined as a "set of events [in teacher's adoption of ICT] that stand apart from others" (Newman & Robey, 1992, p. 253). In other words, an episode indicates the end of the sequence of one particular activity and the beginning of another. The *encounter*, on the other hand, is a delimiter that exists between episodes. In this model, episodes are described in terms of relationships between the actors in the story (teachers, students, parents, administrators, IT personnel), where (a) any actor can take a lead in the episode, (b) the actors can work jointly with one another, and/or (c) the actors may be involved in the ambiguous relationship of equivocation. Here, *equivocation* is defined as an episode in which relationships between actors are not clear and the whole project has an uncertain future. During episodes of equivocation, both the teacher and the users (mostly students) have opportunities to influence the course of the events that follow. An encounter labeled as *acceptance* is usually followed by an episode in which conflict is absent. *Rejection*, on the other hand, involves the actors in conflicting and confrontational situations where one may overcome the other and gain control of the project. To further define rejection, Newman and Robey mention "resistance,

threats, coercion, appeals to higher authority, withholding information, and distorted communication" (p. 255). The visual model of each narrative is presented in the form of a line graph starting from the antecedent condition, moving through episodes and encounters, and ending in the state with which the relevant thread of the story concludes. The teacher's feedback had a two-fold purpose: as further validation of this methodological approach and as a contribution to the final report. The feedback process also highlighted the differences between the teacher's perceived reality (as expressed in his stories of ruin and success) and the actual situational reality (as represented in the process of data analysis) involving the teacher's use of ICT in school.

Brief summary of Tom's story, "The Website of Ruin"

> In June of 1999, a group of parents decided to independently author a website that would reflect our school. The following November, the website was presented to the greater school community. At this point in time, I was appointed *School Webmaster,* responsible for the maintenance of the existing template and the administration of the subsequent classroom-based web pages. When I received the website template, there were a number of unresolved technical issues. This website had been authored using very "high-end" web-building software. At the school level, we had no access to this program due to both provincial licensing restrictions and to its prohibitive cost. I came to the conclusion that the ongoing maintenance of the website would be nearly impossible within the present context and consulted my 15-member student technical team about it. After much discussion, they recommended purchasing the original software. I presented the recommendation to School Council, and, after some deliberation, we received the expensive program. Being already two months behind schedule at that point, we employed a jigsaw strategy to break up our technical team's workload. One of the advanced students from Grade 8 offered to learn the new program and agreed to work with me to form some tentative maintenance plans. The remainder of the team was split up into dyads, each commissioned with the development of one homeroom class's web page. Within this process, my role was to: (1) train the dyads in the software; and, (2) support them as they, in turn, taught this software to two student representatives from each class in the school. By doing this, I hoped to facilitate some collaborative learning opportunities for both myself and for the students. My personal learning expanded exponentially throughout this process. Having a rudimentary understanding of web page building as a process but with no previous direct experience, I took on the role of learner. I worked with my student partner, asking many questions of him. I practiced using the new program alongside this student and made technical notes for future reference. In personally providing the initial, hands-on training and follow-up tutorial sessions on the companion software for the dyads, I was able to reinforce my own understanding of the theoretical links between the old and new programs. I spent a considerable amount of time engaged in active problem-solving with my technical team; and, I consulted with the original programmer via email when we encountered issues of serious complexity. My learning

seems best described by one word: *challenging*. When I was first told that the website was being authored independent of the school, I realized that it could become quite eventful for me in a political sense, seeing that, at the time, I fulfilled the role of *Site Computer Lead*. Once given the website mandate, I quickly realized that I could not properly administrate its development without abdicating some of my other responsibilities, as I was the only on-site technical resource person. The parents, unfortunately, did not recognize this factor. Due to the obviously tenuous nature of this situation, I felt a strong degree of personal discomfort. However, once my situation was settled on an emotional level, I was able to fully embrace this learning opportunity. On a practical level, this opportunity innately challenged my organizational abilities. In addition to my core teaching assignment (Gr. 5 - English, French; Gr. 1-8 - Information Technology), I also supervised electronic report cards, provided technical and computer support for all staff, and trained teachers in both hardware and curricular software. These extra responsibilities, over and above my regular classroom teaching, added an average of 10-15 hours per week over and above my regular work throughout most of the academic year. I had initially estimated that website development would require four additional hours out of my weekly schedule. In reality, the first two months my team and I spent a *minimum* of six hours per week. In order to respond effectively, I had to reorganize my work timetable on a weekly basis with both my Administrator and other key people. In hindsight, I have concluded that the affordance of time is a key factor in this learning opportunity. Time or lack thereof, served as both a positive impetus to my learning and also as a negating parameter. On one hand, it forced me to rise to a new level of effectiveness; while, on the other, it created a scenario of significant risk in which errors were more likely to occur. Both the level and quality of parental involvement impacted my learning as well. Had the support rendered been unconditional in nature, my experience would have been fairly positive. However, the support was contingent upon the meeting of expected deadlines and these deadlines were inextricably linked to the self-esteem and personal pride of a number of parent stakeholders involved in the initial creation of the website. When I could not deliver the anticipated product within the allotted time frame, I was branded incompetent, irresponsible, and, for the first time in my career, I had a formal letter of complaint registered against me. I have always maintained that truly meaningful learning always comes with an emotional price tag. While both my sense of personal autonomy and ongoing enthusiasm were significantly brutalized throughout this scenario, my learning was expedited and strengthened because of it.

Interpretation of the "Website of Ruin" Story from the Perspective of the Social Process Model of User–teacher Relationships

The storyline of the "Website of Ruin" demonstrates the dramatic sequence of events around the teacher's inauguration into the role as School Webmaster (see Figure 1).
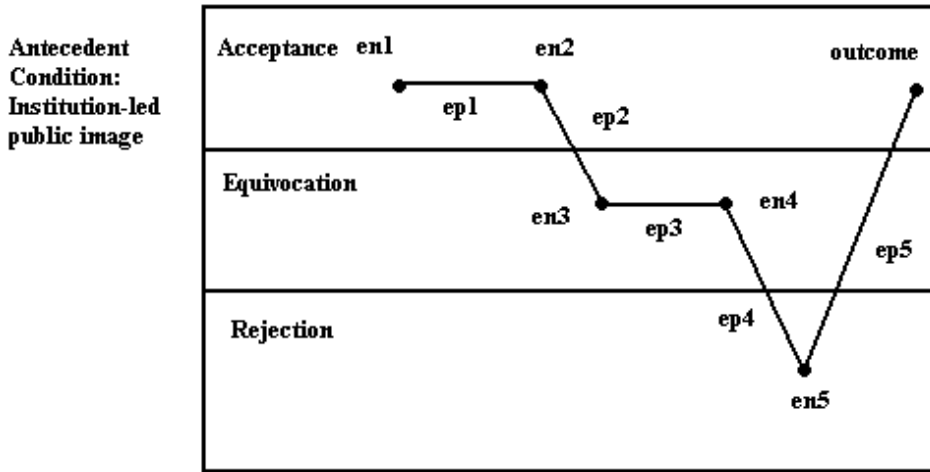
Figure 1. Process map of the "Website of Ruin" story. Legend: Encounter (en) and Episode (ep).

The story begins with a disruption in the otherwise institution-led routine of maintaining the school image.

> *Encounter 1*: In June of 1999, parents decided to create a school website. *Episode 1 (parent-led, acceptance)*: The following November, a group of parents presented the website to the school administration and Tom was appointed as Webmaster. *Encounter 2*: As School Webmaster, Tom was charged with the maintenance of the existing website template, as well as the creation and administration of subsequent classroom-based web pages. *Episode 2 (teacher-led, equivocal)*: Tom encountered lack of access to the website design software. *Encounter 3*: Tom took the challenge to his 15-member student technical team for consideration. *Episode 3 (joint development, equivocal)*: After much discussion, Tom and students agreed to recommend the purchase of the original software to the School Council in order to carry out the website mandate. *Encounter 4*: The School Council permitted the purchase of the software. *Episode 4 (joint development, equivocal)*: Together with students, Tom strategized to organize training and website development. All benefitted from increased learning gains. *Encounter 5*: When Tom was not able to deliver the anticipated product within the expected time frame, parents registered a formal letter of complaint against him. *Episode 5 (teacher-led, acceptance)*: Tom reorganized his work timetable on a week-to-week basis. *Outcome*: The outcome of this story is overall positive. The website was successfully maintained to the satisfaction of school officials, parents, students, and teachers.

This *social process model of user–teacher relationships* is positioned around the relationships amongst the various actors in the story—the institution and the parents (as external factors to the story) and the teacher and the students (as internal to the story). In this interpretation, the teacher, students, and parents are the main actors, although there are others, including a technician who provided occasional support. However, the relationship between the teacher and the

students in this story supports the idea of a possible synergistic alliance with elementary school students during the process of the teacher's ICT adoption. In this model, there was only one encounter of rejection where the teacher was put on the spot by the external actors (i.e., parents) and labeled as incompetent to lead the project. It must be emphasized that in problematic situations, the view that external actors have of the situation may be very different from the view held by the internal actors. In other words, the parents or school administration held the teacher accountable as the individual solely responsible for the project; while, in actual fact, the events that preceded the conflicting one (i.e., the letter of condemnation) can be best described as joint efforts at new learning. Although three out of the six encounters fall in the problematic regions of equivocation and rejection, the story overall has a positive tone—it starts and ends in the acceptance region. The change in the system (i.e., the maintenance of the school website to be supervised by a teacher) is initiated externally—by the parents. Both the school administrations and the teacher (not entirely of his own choice) accept the parents' challenge and decide to view it as an opportunity.

Encounter 2 is a phase of stable implementation where the teacher becomes involved in the activity. The second episode is teacher-led and ends up being equivocal as he faces technical obstacles that he alone cannot resolve. The fact that students also become involved during Encounter 3 does not resolve the problem, but the situation remains stable through the joint effort of the students and the teacher. Encounter 4 brings temporary relief, which turns the situation in a positive direction. It marks the beginning of the project implementation phase (Episode 4), where, on an individual level, lasting changes happen. This is a significant time of learning and problem-solving for both the teacher and the students.

Encounter 5, unexpected from the practitioner's view, when he is challenged and almost rejected as a leader, is followed by the positive Episode 5 when the teacher resolves the issue and continues in the position of *School Webmaster*. The implication follows that administrators need to be supportive and understanding of the overall costs of ICT projects, including teacher workload. As the outcome is positive and the project was successfully completed, it may be considered a model approach to ICT adoption in the school setting.

Brief Summary of Tom's story, "Challenges of an Integrated Pedagogical Delivery Model" (Pugh, 2007; 2005)

> By the beginning of December 2004, I had already introduced the idea of Action Research to my grade 7 and 8 students. The anticipation was high amongst the students and a large number had brought back signed permission forms. In consultation with the homeroom teachers of these two grades, I had set up two ICT scenarios, the less complex of which was for the Grade 8 class. In keeping with the activities of the homeroom class, I set about to conduct a three-week, introductory math skills module in the lab using *Math Trek 7, 8, 9* (Nectar Foundation) as the primary ICT application. The week before start-up, I registered the class as a user group within the software, repeatedly logged in as individual students and created mock evaluation files through the on-line student journal tool. Everything worked well except for the print

function—I could not generate hard copies of the mock journals. I notified our IT technician who came in immediately to rectify the situation. He was successful and I proceeded to show the homeroom teacher how to access the student records. However, when students logged onto the network and began to register individually within the software, every student, with the exception of the first one, was rerouted back to the network log-in screen. I tried different solutions—all to no avail.

Twenty-three pairs of eyes locked onto mine. I apologized and enlisted their opinions as to what had gone wrong. Neither reactions nor answers were offered—just twenty-three pairs of eyes stared at me. My momentary blur gave way to the voices—whispering at first and then louder and more strident: "It's just like always…nothing ever worked before either...what a waste of time! ... It's okay, maybe it will work next time—we're sort of used to this." The next morning, I contacted our technician. We recreated the conditions of the previous failure and it happened again—we could not log any student in other than the first one registered. He left with no promise of a remedy. As I watched him go, I found myself wishing that I did not have to be accountable for this unwieldy problem. The technician visited two more subsequent times and we continued to communicate via email—neither of us had any resolution. Eventually, the log-in problem was resolved as I discovered in early January that the individual rights and permissions of students had to be rebuilt in order for the registration issue to be resolved. By this time, however, my golden opportunity with the Grade 8 class had come and gone—I would be forced to reschedule the project for later in the year. Despite this set-back, early-February found me preparing for the Grade 7 ICT-based experience. This attempt was to be much more complex. Rather than one program, we would be using two: *Corel Presentations 10* (Corel) and *Inspirations 7.5* (Atomic Learning). After consulting with the homeroom teacher, I decided to frame this ICT project within the curricular area of History–early Canada. Instead of a three-week timeline, this attempt would necessitate four weeks of preparation and two weeks for the actual presentations. The teacher and I proposed a list of characters and events from which the students could choose their topics. We distributed this list and I then began to initiate timetable swaps amongst some of the teachers whose classes I instruct on a rotary basis. I managed to negotiate a three-way timetable swap that would provide me with 80 extra minutes of lab time with the Grade 7 students over three cycles. I combined this with extracurricular lab access before and after school—6 times at 30 minutes each. As well, the classroom teacher designated three homeroom computer periods to this project. The main intent was to see if students could use the organizational properties of the two programs to inform and frame their final project. Their resulting presentation had to equally use both pieces of software, complete with a hyperlink interface from one to the other. I created a mock presentation using both programs and presented this to the students. Their enthusiasm was encouraging. It was nice to hear comments like: "This is SO cool!" At the end of this introductory session their homeroom teacher said:

> I'm so glad that you are doing this with them. I want to do this kind of thing with them—it is valuable. I understand philosophically and support this—I just can never get it to work for me.

We began the presentation phase of our project right on schedule, but were unable to get all student presentations finished within the original two-week block. Instead, we wrapped up the last presentations during the week of April 5. I was impressed with the resultant levels of technical prowess—many had added music, animated graphics, and voice-overs to the content of their presentations. It was evident that the students had taken the introductory rudiments of the programs shown to them and moved to the next level. At the end of the first session of presentations, the homeroom teacher commented:

> This has turned out to be an awesome experience for the kids. They have learned so much in such a short period of time. These two programs are so useful. I have learned a lot too, just by watching…we should look at doing this again…. Thank you for doing this. They would have never gotten this with me alone. I get too frustrated because things have never worked properly.

Interpretation of "Challenges of an Integrated Pedagogical Delivery Model" Story from the Perspective of a Social Process Model of User–teacher Relationships

This action research project timeline had less fluctuation than that of the previous story (see Figure 2). There were no incidents that can be described as rejections, but there were still some conflicting (equivocal) events in the middle of the project. Also, in contrast to the previous story of ruin, this project was led almost solely by Tom himself. However, as in the first story, *The Website of Ruin*, the teacher–student relationship was crucial to the realization and success of the project. This time, in the situation of equivocation, which was the consequence of the unrealized first part of the project with the Grade 8 students, Tom was forced to reallocate some of the control he had over the first part of the project, and, together with the Grade 7 students, he experienced the joy of success.
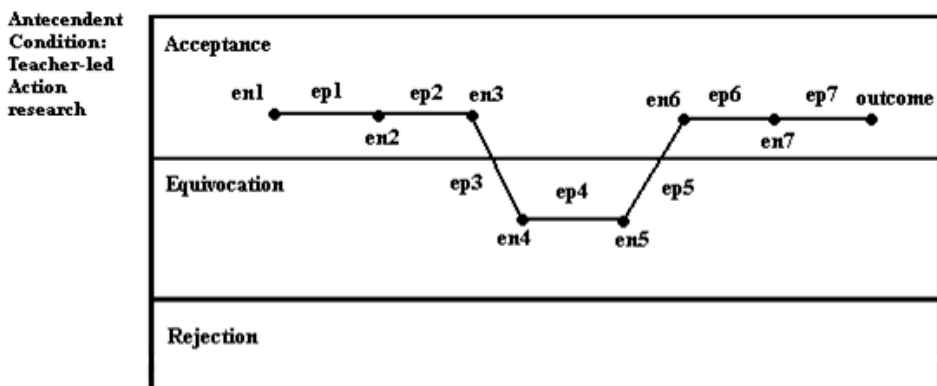

Figure 2. Process map of Challenges of an Integrated Pedagogical Delivery Model. Legend: Encounter (en) and Episode (ep).

The story starts with the teacher introducing action research to his Grade 7 and 8 students.

> *Encounter 1*: In consultation with the two home-room colleagues, Tom set up two ICT-based scenarios. *Episode 1 (teacher-led, acceptance)*: Tom created mock evaluation files for Grade 7 students. *Encounter 2*: Printing problem was successfully resolved by the IT technician. *Episode 2 (teacher-led, acceptance)*: Tom used the mock files he had created during testing to instruct the homeroom teacher on how to use the software. He later met the students in the lab. *Encounter 3*: With the exception of the first student, no one else could log into the *Math Trek* application. *Episode 3 (teacher-led, equivocal)*: Tom tried unsuccessfully to resolve the problem. *Encounter 4*: The students voiced their disappointment, saying: "… we're sort of used to this." *Episode 4 (teacher-led, equivocal)*: Tom worked with the IT technician to find a remedy. *Encounter 5 (outcome)*: The log-in problem was resolved too late by the teacher himself. *Episode 5 (teacher-led, acceptance)*: In early February, with homeroom colleague, Tom started preparations for the Grade 7 ICT experience. *Encounter 6*: Tom's mock presentation of both programs was well accepted by all. *Episode 6 (teacher-led, acceptance)*: Tom organized two asynchronous, video-recorded sessions of students' presentations. *Encounter 7*: Due to timetable and lab access problems, the presentations could not all be finished within the arranged timeframe and additional presentation times were added. *Episode 7 (joint-development, acceptance)*: The students presented their projects to the satisfaction of both Tom and the homeroom colleague. *Outcome*: On the last day of presentations, the students positively evaluated their learning experience.

Discussion

Although the two stories describe different types of learning events, both share some common themes. In both stories, the teacher-storyteller described his continuous struggle to implement technology. First and foremost, *time* appears as a key factor in terms of pressure put on the teacher to meet curriculum needs. Secondly, in order to successfully integrate ICT into his students' learning activities, the teacher had to overcome various first-order barriers (Ertmer et al., 1999; Hemsley-Brown, 2004) to technology integration, especially the limited access to software, lack of adequate technical support mechanisms, and loss of his own personal time. While this teacher was persistent enough to overcome most difficulties, it is questionable whether someone else with less stamina could sustain the challenges, a point reinforced by the homeroom teacher (in the Success scenario) that she "can never get [technology] to work for [her]." The homeroom teacher was not yet ready to start using it on her own, despite of the claim that she "understands [it] philosophically" and that she "learned [how to use technology] just by watching." In this instance, there is a strong disconnect between the homeroom teacher's perception of the use of technology and the reality of its use.

In both stories, the teacher-storyteller demonstrates the characteristic perceptions of someone whose central involvement in the situational issues effectively negates his ability to clearly view the implications of the ICT events

in which he was a participant. His first story of "ruin" was deemed positive in end-result by the educational researchers, the co-authors of this paper. Conversely, the second story, viewed by the teacher as one of success in relation to the overall ICT learning experience for students, was not deemed to be a wholly positive one by the educational researchers. The fact that the teacher brought the action research project to successful completion with one group of students does not counterbalance the fact that a similar attempt had failed with another group of students. However, through the process of data checking, it was possible to align the interpretations of the two stories with the teacher so that both stories appeared in the end as being less on the extremes of the ruin/success continuum.

Through the ongoing, interpretive examinations and interactions associated with the writing of this paper, we experienced first-hand the *linguistic* and *operational barriers* (Goodyear et al., 2006) that exist between educational practitioners and theorists. It is accepted that without intense, mutually-productive discussions, the linguistic barriers, inherently found within these interactions, would prove highly problematic and disconcerting for most teachers. In our specific case, the words "success" and "ruin" are highlighted as flashpoints of linguistic barriers, being defined very differently from the perspective of a teacher-practitioner as opposed to that of academia. Hence, with the extrapolation of this difference, the *linguistic barriers* of Goodyear et al. commute themselves into very real opportunities for both parties to learn about and from one another in meaningful ways.

Given that there is a wide gamut of teachers' technological skills and attitudes towards technology use, what kind of support structure is needed? For example, in the case of the homeroom teacher from the second story, she is hardly at the first stage of familiarization with technology (according to a classification by Hooper & Rieber, 1999). On the other hand, when the second story finishes, the teacher-storyteller is clearly at least in the fourth stage of the Hooper and Rieber classification. Besides becoming *familiar* with the software applications, he also *utilizes* technology in the classroom, *integrates* it through action research, and sees himself as the *facilitator* of students' learning.

In addition, in the first story, the teacher-storyteller also reconceptualizes the teacher's role *as the learner*. The fact that he considers students as partners in learning about technology, even leaders in this process, bears this out. These findings suggest that Hooper and Rieber's (1999) five developmental phases in mastering technology may be extended to include yet another stage: *reconceptualization of the teacher/students' roles as partners in learning* about technology. The perceptiveness of the teacher-storyteller to learn with the students was instrumental for the success of the website project. Therefore, *teachers' often solitary excursions into the unknown world of technological innovation do not have to be such*. Involving other stakeholders as partners may ease teacher-practitioners' efforts in gaining further technological skills.

Conclusions: Overcoming Barriers to ICT Adoption

One of our goals in this paper was to encourage the creation and pursuit of purposeful and meaningful opportunities in which educational researchers and teacher-practitioners can act as collegial facilitators for each other's learning.

Long (2008) stipulates that small stories, such as those we used here, serve as "'carriers of theory," or "cognitive koans": they draw people into central theoretical issues through emotional identification and the concentrated presentation of ideas" (p. 1). Although initially teachers might be reluctant to share their emotions with researchers due to the possibility that they could be viewed as incompetent, there is a value in such exchange (Hur & Brush, 2009). During this research, the sharing of the teacher's emotions happened during the collaborative analysis of the previously written narratives and in the narratives themselves. Through such an authentic process, a more functional understanding of the events that influence teachers' experiences with technology may be reached and the linguistic and operational barriers between theorists and practitioners, as described by Goodyear, de Laat, and Lally (2006), may be overcome (see Figure 3).

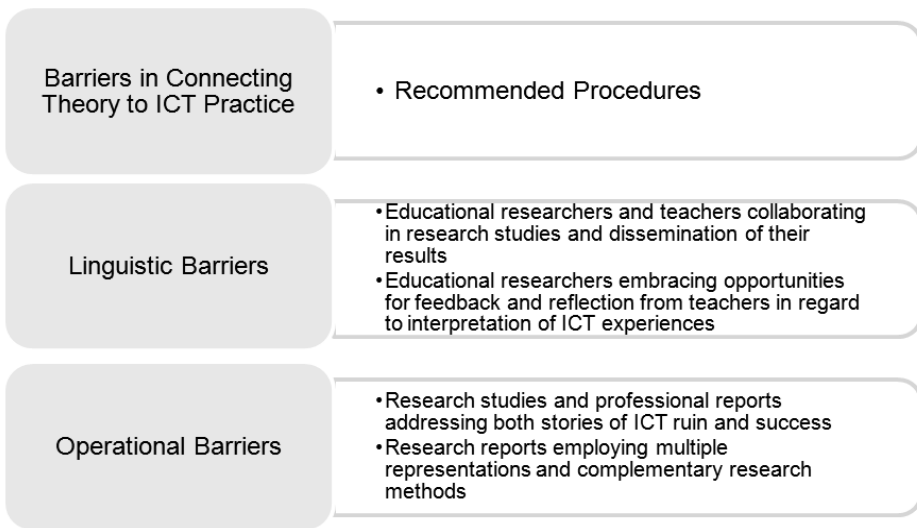| Barriers in Connecting Theory to ICT Practice	• Recommended Procedures
Linguistic Barriers	• Educational researchers and teachers collaborating in research studies and dissemination of their results • Educational researchers embracing opportunities for feedback and reflection from teachers in regard to interpretation of ICT experiences
Operational Barriers	• Research studies and professional reports addressing both stories of ICT ruin and success • Research reports employing multiple representations and complementary research methods

Figure 3. Recommendations for overcoming barriers in connecting theory to ICT practice.

As the teacher-storyteller commented after data analysis was completed:

> My personal experiences within the context of this academic research have allowed me to express, explore, and validate my beliefs about ICT learning and integration from two standpoints: one of methodological awareness and the other of authentically professional, pedagogical reflection.

Thus, teachers do not have to work alone when planning, doing, and interpreting their experiences with ICT. Through synergistic alliances between educational researchers and teacher-practitioners and greater involvement of practitioners within the research, as suggested by Hemsley-Brown and Sharp (2003), ICT praxis materializes. Hixon and Buckenmeyer (2009) recommend that in regard to technology integration, emphasis should be put on teachers' beliefs about teaching and learning. We here suggest that teachers' authentic narratives about encounters with ICT should be used as tools for this purpose. Building on

Ertmer et al.'s (1999) differentiation between first and second-order barriers in technology integration, Hixon and Buckenmeyer (2009) call for ways to "address all of the barriers teachers are facing, including both first-order (external to teacher) and second-order (internal to teacher) obstacles" (p.143). This paper further extends this view by noting the importance of addressing linguistic and operational barriers (Goodyear, de Laat, & Lally, 2006) between practitioners and theorists.

Further research is needed in order to examine how teachers experience the world of technology. This important task may be less difficult if both theorists and practitioners reach across narrative space, as Clandinin and Connelly (2004) would put it, in order to work meaningfully with each other.

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