Education and Technology:

Manitoba Action and Reflection

A snapshot of educational technology use and thought in Manitoba in 2016.

Edited by:
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Mike also wants to thank Rennie for jumping on board with this project, He is a wise and thoughtful collaborator, and he was the person primarily responsible for putting the final product together. Rennie hopes that the errors I have made in the process can be forgiven. Please don't blame the authors for any formatting peculiarities that you may find - they are my errors.

Mike Nantais originated the idea of putting together this book together so we sat down after a ManACE board meeting and began the process of identifying possible contributors. The response from the people we approached to write a chapter was overwhelmingly positive. We are so grateful to all those who agreed to participate - even the few whose work/family did not allow them to finish. They will be in the next volume as will the many other fantastic teachers who we didn't ask this time; there are so many of them.

Great idea Mike!

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About the Editors

Mike Nantais. PhD, is an Associate Professor at Brandon University. He is a teacher educator with an interest in educational technology, in particular, the intersection of education and social media. Mike came to the university after a 3 year stint as the Principal of a K-12 school and a 30 year career in public schools where he taught mathematics, sciences, and a variety of computer courses. His personal website can be found at http://people.brandonu.ca/nantaism/ and on he is on twitter @MikeN_bu

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Introduction

Mike Nantais

Welcome to this ebook, with it, we hope to take a look at educational technology use in K-12 schools from a Manitoba context. A few years ago, I began to think that it might be beneficial to have an easy-to-access volume that documented some of some of the great things happening with technology in Manitoba schools. Even today, wise and powerful integration of digital technology in classrooms seems to occur in pockets around the province. Yet, it is also true that many Manitoba teachers are using technology in cutting edge fashion, we don't always need to look far to find them! The purpose of this book is to highlight some of those extraordinary applications of digital technology for learning in a hope to inspire others to see that powerful learning, enhanced by what digital technology offers, can take place and that opportunities can arise by the thoughtful use of technology. Or, perhaps it will inspire still others to share what they are doing in their classrooms and schools. As Andy McKiel describes in his narrative, his use of technology spread to others in his school as they asked him, and his students, to share what they had learned.

After an initial call for submissions, and perhaps a little arm twisting, we ended up with a range of contributions from around the province. In the call for chapters, we encouraged authors to critically reflect on their use of technology. We reminded authors that the purpose of this ebook was to share exemplars of technology infusion and *how they make a difference to our thinking and pedagogy*. What has changed? We often hear that technology is just a tool, but that dismisses the powerful impact that technologies have on learning, and indeed, on our society. A number of questions were suggested to prompt thinking and reflection:

- Who has benefited most from the technology infusion?
- Who has benefited least?
- How do the benefits get distributed?
- What has your classroom gained?
- What has your classroom lost?
- Does it change the power structure of the classroom (for the teacher and among students)?
- How has your thinking about assessment changed?
- Has 'time' changed in your classroom?
- Has collaboration been altered?
- Are any 'new voices' heard in your classroom?
- Where are the relative values of the technology, the process, and the product?
- Do you talk with students about issues such as tech design, mineral sourcing, manufacturing, reuse and recycling? How does the conversation go?

Postman (1995) wrote, "A new technology does not add something, it changes everything." We wanted authors to explore these ideas in their work. We encourage you to do the same as you read these stories, and as you reflect on your own practice. A common exhortation today is that pedagogy should

come before the technology. We agree, however, thoughtful, careful use of digital technology can have an impact on that learning. We need to be reflective and thoughtful about these changes. You will find in these pages, many applications of technology that result in new learning opportunities for students.

These chapters are personal stories about using educational technology. The fifteen chapters included will, we hope, inspire readers to examine how educational technology might be used in their classrooms and schools to enhance the experiences and learning of students. There are a wide range of stories, they range from technology in use, to personal stories of transformation, to thinking about where we might go next.

In Part One, we look at some current trends in using educational technology. Devin King starts us off with a fascinating look at developing literacy through the use of video games. Eva Brown and two teacher candidates at Red River Community College, Jessica Lister and Robert Porczek, write about technology rich learning in teacher education. Next Roy Norris describes the pioneering 1:1 computing initiative at Dakota Collegiate. Tara McLauchlin and Joan Badger tell us about building citizenship in a digital age in their work in St. James-Assiniboia School Division. Phil Taylor completes this section by examining Google Apps for Education.

In Part Two, we turn to looking at how digital technology can lead to connecting and sharing beyond the walls of the classroom, leading to deep, rich learning experiences. The "Kenton Girls", award winning educators, Leah Obach and Devon Caldwell, lead us off by sharing how they connect their classrooms in southwest Manitoba with each other and with others around the world. Next up, we hear how Zoe Bettess uses social media to connect her grade 3/4 students, located in Thompson, with many others, including Canadian Olympians! To round out this section, a young new teacher, Kirsten Thompson from Ste. Rose, in only her second year, describes how she uses blogging to "knock down walls and expand opportunities" for her grade eight students.

Part Three takes us into four compelling stories of personal transformation. The amazing Andy McKiel describes how his love of computers from the age of 10 led him on an incredible journey of professional growth that taught him that connecting and sharing can lead to tremendous learning and adventure for our students and for ourselves. Ryan Miller then tells us how his love of music combined with tools of technology changed his career. Melissa Volekaert Lander describes how her foray into robotics at Meadows School in Brandon allowed her to let go of control and shift power in the classroom. To complete this section, David Nutbean takes us into mythology as he slays the three heads of Cerberus in his quest to "transform teaching into a heroic experience."

Our final section, Part Four, we ask, "Where do we go from here?" This section begins with a reprint of an article by one of the editors, Mike Nantais, who examines how we can empower students by extending trust. Next, co-editor, Rennie Redekopp challenges the notion of digital citizenship by describing what it means to be a global citizen in a digital world. Our final chapter belongs to Matt Henderson, newly minted Principal of the Maples MET School, he examines ecoliteracy and how he uses technology to explore this important topic.

Together, these chapters explore the many ways that technology is being used in Manitoba classrooms. We hope that you are inspired to explore some of the ideas, or to share your own widely. When we share our stories and ideas, we become better teachers. As David Wiley once said "if there is no sharing, there is no teaching." So let's start the sharing so that we can work together to meet the needs of our students, yet, at the same time, let's do it using critical thinking and considering whether what we are doing is making a positive difference.

Enjoy the stories within!

Reference

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Part 1 - Current Trends and Issues

Chapter 1 - A Link to the Present: Literacy Learning through the Use of Video Games

Devin King

Understanding Innovation and Video Games as Texts

"I suppose it's only a matter of time before I'm affected, too." (The Legend of Zelda: A Link to the Past)

There's only one way this can go. It's going to be fine. You know, and I certainly know, where we're going with this; at least, you probably have a fairly good idea of what you're going to read. This is a book about innovations in education in Manitoba. There will be no deviations, no opportunities for change while you read this. You won't be able to interject with a better idea (which you will surely have) and alter the course of this chapter. No, I will write the path; you will follow. That's fine. But there's only one way it can go.

What then do we mean when we say "write?" This should be an obvious answer. Traditionally, it has been the simple act of committing written ideas to the page. That's a perfectly fine and workable answer, and we've spent hundreds of years with that idea in mind. At this point though I think it might behoove us to broaden our scope of understanding of what we mean when we say "writing." Do we truly mean that the act of writing can only be on the page? Do we mean that writing is an act of communication with a properly utilized syntax and sentence structure? Does the use of a different medium – say, a stone tablet with words chiseled into it – make a difference? And if not, then does the medium matter at all? Once we take even one step away from the exclusivity of ink to the page, the notions of writing become seemingly arbitrary.

The same can be said of reading. What is meant to be read is changing, and even what constitutes "good" reading. Increasingly we describe texts such as movies or paintings as being "read." The validity of the word in this broad sense, as with writing, seems determined on one's emphasis on the reading of a dictionary. Can one "read" a movie, according to the dictionary? No, it would seem perhaps not. But in an abstracted way from the intent of the definition, and when considering a changing social landscape? Well…

Literacy – reading and writing – is power. Those determined to define either in the strictest sense require strict definitions to maintain their standing and worth in the field. Imagine these poor gatekeepers as the dawning realization of multiple literacies hits them. The gatekeepers – teachers like myself, professors, other writers or readers – all have a stake in the success of traditional literacy. What does it

mean if there are now multiple literacies, and in fact, your literacy, once dominant, is a rapidly decreasing currency? Who could blame the gatekeepers for fighting back against multiple literacies. The very definition of their understanding of what it means to be literate is changing, and if this change were to happen, it would mean that they are no longer skilled to participate fully.

I was struck by the prevalence of video games. Consider Grand Theft Auto V, which functions as one of towering examples of the demonization of video games. Within 24 hours of release, the game had sold over 11 million copies, (Goldfarb, 2013) and within six weeks had sold 29 million copies (Matulef, 2013). Consider that – suddenly, all of those homes had a powerful and popular tool to replicate all manner of crimes. Contrast this to Harper Lee's Go Set a Watchman which only sold 1 million in its first week. This ubiquitous descent into Id was eye-opening for me, and it suddenly occurred to me the relevance this would have to my students. As someone who carefully considered pop culture and its application in the classroom, it suddenly dawned on me; video games would be [consumed in the homes of students far more than books, movies or music.]. Whether we liked to consider them texts or not, they would be there, and students would be playing them. Most insidiously, all this would go undetected by my fellow teachers. Who could blame them? Teachers work very hard to juggle all manner of factors when creating learning experiences for their students. Video games weren't on their radar, and it was only by chance that it had crossed mine. Clearly, someone needed to be talking about this. I set out developing a Special Area Group (then-SAG, now-SAGE) session to discuss the perils of games and its erosion of students skills in literacy and critical thinking. But a funny thing happened.

As I began researching, I came across the exact sort of things that you would expect to find when researching video games and youth. At some point though, I came across some work that talked about how video games were good for learning. This was pretty contrary not only to my preconceived notion of video games, but also what seemed to be the wide societal consensus. Somehow I managed to stumble across James Paul Gee's What Videogames Have to Teach us About Learning and Literacy, a seminal text on the use of video games in the classroom.

All this by saying…what, exactly? What it comes down to is the idea of progressive education. By widening our definition of literacy we allow students to make meaning from something that traditionally would be only a book, short story or poem, but now might include video games. This is vital, because the innovation isn't just a new tool or fancy device. It means that innovation can actually be a strategy for how students are able to learn more effectively. In all of this, we have a recognition that there has been a change (in society, in culture, in education) and that we can also change. There are those who will howl, of course. Their way of understanding the world is being pressured. But it's not about us, and it's never been about us. It's about the students.

With these new ideas forming in my mind, I set off to try to apply them to my classroom. At this time, I was teaching a split class of grade 4 and 5 students at Harrow School. This was a period of change, as the longtime principal had just retired, and the new principal, Leslie Macgillivray, had just been hired. Now that I had this great new idea, it was the case, as often is with great new ideas, that I needed some money to put my ideas into action. I knew that I would want to use a video game that had some grounding in a strong narrative, and so my choice was The Legend of Zelda: The Wind Waker. In addition to buying this game, I would also need to buy the console on which to run it.

And so it was that one of my first conversations with my new principal was about requesting money – and not only that, money to buy video games for the classroom. I was not optimistic, but I laid out my rationale and pedagogical connections and hoped for the best. Leslie, to her credit, took my

request seriously. She told me later that the request did take her aback, but when she ran the idea past her own son noted his excitement and immediate engagement in the idea. With that, my funding for video games was approved.

I can't say that it was an immediate and simple transition. I brought in a small TV from home and set up the Nintendo GameCube console, creating a small video game centre. At this point, I started considering the very real logistics of this. How do we fit everyone around a TV? How do we ensure equal participation when there is only one controller? How do we prevent students from just staring at a screen? When do I use the video game centre in the day? I began doubting my plans; the pedagogical value was there, but I seemed to have fallen into a trap that many teachers with big ideas fall prey to: practicality.

My students were obviously excited about this possible new endeavour. Many (but not all) had played video games in the past, and were excited to do something fun and something they were good at. This was significant because as teachers know there are some students who struggle to find success in their day. I was presenting an opportunity for them to successfully demonstrate skills. As a teacher, I was excited that many of the students, without having played the game itself, already had prior knowledge about the series and were able to use literacy skills in pre-reading and text connections. One day though, I informed them that I didn't think it would work; I couldn't find a way to work out how everyone would do it and still get something from it. I said the experiment was done before it started – unless, they had any ideas. It was a genuine question, as I try to bring students into the planning of their learning as much as possible. When we allow students to add their voice into classroom planning, it allows them to take ownership of what happens in the class and engages them in the material. The reality is that more and more we trust students to be leaders and participate in the world, but often don't give them the opportunity to be those people or practice those skills in the classroom. My experience is that once you have fostered that culture, it only improves the classroom. Indeed, that was the case here; their feedback was instantaneous.

They told me that my concerns were easily solved. Most of the structure for how this centre would operate was planned by the students. They didn't mind that they would have to work in pairs to play the game, even if it meant that only one person would be able to play. It would still give both students a chance to see the plot unfold, and most students had already become accustomed to the concept of watching what's called a "Let's Play," a YouTube phenomena wherein people upload their gameplay of a videogame, often with their own narration. The time consideration was mapped out too. Each pair would be able to play for 15 minutes at a time, twice per 6-day cycle, and once a cycle we would all come together as a class to talk about what had happened in the game and our experiences with it.

The last part was trickiest. In order to accommodate all this game time, it meant that the video game centre was running almost the entire day. Tucked away in a corner, it wasn't a distraction for students, but it meant that at any given 15-minute interval, there were students who weren't part of the lesson that the other students were a part of. Outside of specific lessons or classes like gym or music, there was always at least one student away from the "main" task. I've come to accept this as a natural part of any classroom. Regardless of whatever nice lesson we plan, there are already a wide range of abilities and performances happening at any given time. Was this any different? It often simply meant that I had to direct students back into the lesson and help them to catch up once they had finished, but this was never an overly gruelling task. In the end, this structure helped to foster one of independent learners. My role wasn't to announce when each student's time to play was. The schedule was posted, and students were responsible to know their partner and the time that they were to play. They were also responsible for

catching up with the work being done while they were at the video game centre by looking at the posted Intent / Task / Criteria that outlined the work at hand.

All that is great. But what did we actually do? Actually, a good teacher will know that is the wrong question to ask. The right question to ask is "what will students learn?" My intent wasn't to revolutionize what students would learn; the objectives are written out in curriculum documents. My focus was in identifying key elements for learning in the text (such as characterization and literary devices) and utilizing comprehension strategies to make sense of the text. There are many other curricular connections, ranging from analyzing the form of the video game text, developing deeper understanding of the text by considering prior connections, and assuming various group roles. There are yet more connections that could be made in curricular outcomes, but the burden of assessing too much and understanding too little of our students is a real one.

My goal was to focus on a narrow range of outcomes in order to better understand my assessment results, but also to attempt to legitimize the literacy within a video game. My curricular outcome choices were perhaps the most traditional of all the outcomes. This was intentional; I didn't want anyone, especially parents, to think that we weren't still using the game as a legitimate tool for literacy learning. My goal was to show that this game could promote literacy was a legitimate text, [like the "regular"] literature that we used in class alongside the video game. I could have easily assessed students understanding of the text in other curricular outcomes, but these ones gave me the best opportunity to demonstrate the legitimate possibility of video games as literacy tools.

Teaching The Legend of Zelda: The Wind Waker

"But then, when all hope had died, and the hour of doom seemed at hand…a young boy clothed in green appeared as if from nowhere." (The Legend of Zelda: The Wind Waker)

The Legend of Zelda: The Wind Waker begins in a small village, on the 12th birthday of the protagonist, Link. The villagers of this island tell a story of a great power stolen by an evil man who was eventually thwarted by a young boy wearing green. As a result, many of the children of the village wear green upon turning twelve years old in honour of that boy, dubbed The Hero of Time. That day, Link's sister, Aryll, is suddenly captured by a gigantic bird, which leads Link on a quest that will see the return of the evil man who was thought to be defeated long ago. The animation style of the game is a unique one; rather than move the game as close to appearing real as possible, the game use cel-shading graphics that makes the game look more like a cartoon.

We began this journey as a class by watching the opening scene that plays when the game begins. It tells the history that has led to story of this game being told in a cinematic form that conjures the feeling of reading ancient scrolls. This is where the approach to learning becomes what might be considered less innovative. This is not necessarily a bad thing. Innovation, and certainly what I suggest here as an innovation, does not mean that we burn the bridges behind us and never look back. There is great value to the decades of research and study that has paved a path towards greater learning opportunities. I would never suggest that teaching video games as texts [in the classroom] also means no longer teaching the written word in novels, poetry, stories, and wherever else we might find it – quite the opposite. The broad innovation in language is a recognition of the multifaceted layers of literacy. Innovation means more than just books, but also video games, and more.

What I mean to say is that it is not particularly inspiring to see how my class treated The Wind Waker in the same manner in which we treat conventional literature. Though for most (hopefully), the idea of discussing reading comprehension strategies, predictions, and inferences we used will not seem like a qualitative innovation, it does represent something important in our understanding of literacies. It is not so much about the text, but the manner in which we approach the game. Ensuring that students are prepared with strategic facilities to encounter any manner of literacies – we can't even predict what they might face in 5-10 years – is vital to their success as literate individuals.

The hope then is that students are able to exhibit skills in transference of skills. In our weekly meetings we would discuss all the important elements of literature that are common in an English class, but we would also discuss challenging moments in our gameplay and the strategies that pairs brainstormed to overcome their challenges. This doesn't particularly relate to the English curriculum. There's no discussion of symbolism, revision process or bibliographies. So it was perhaps a minor tangent, but one I felt important. Students in our schools repeat one of two phrases: "I'm stuck," or "I don't get it." These are not bad in and of themselves. They represent the student reflecting a very true understanding of their educational existence. So the key in those moments is in how teachers react. I know many teachers who will, without hesitation, explain the whole concept again or even go so far as to do the work for the student to get whatever solution they need. This is not learning, at least not for the student. Too often, students don't feel empowered to solve their own problems and are too afraid to take risks. However, this isn't the case in video games. In The Wind Waker we would often discuss those challenging moments, and everyone would share the different ways they would solve the problem. This is vital, as it fostered a culture of problem solving that showed there were many different ways to solve the problem.

So, no, there is no curricular outcome for that. However, we began what I referred to as a transference of skills. Using our actions and skills in The Wind Waker as a model of behaviour, we began to talk about how to act strategically in all other aspects of school. Now, when students would say that

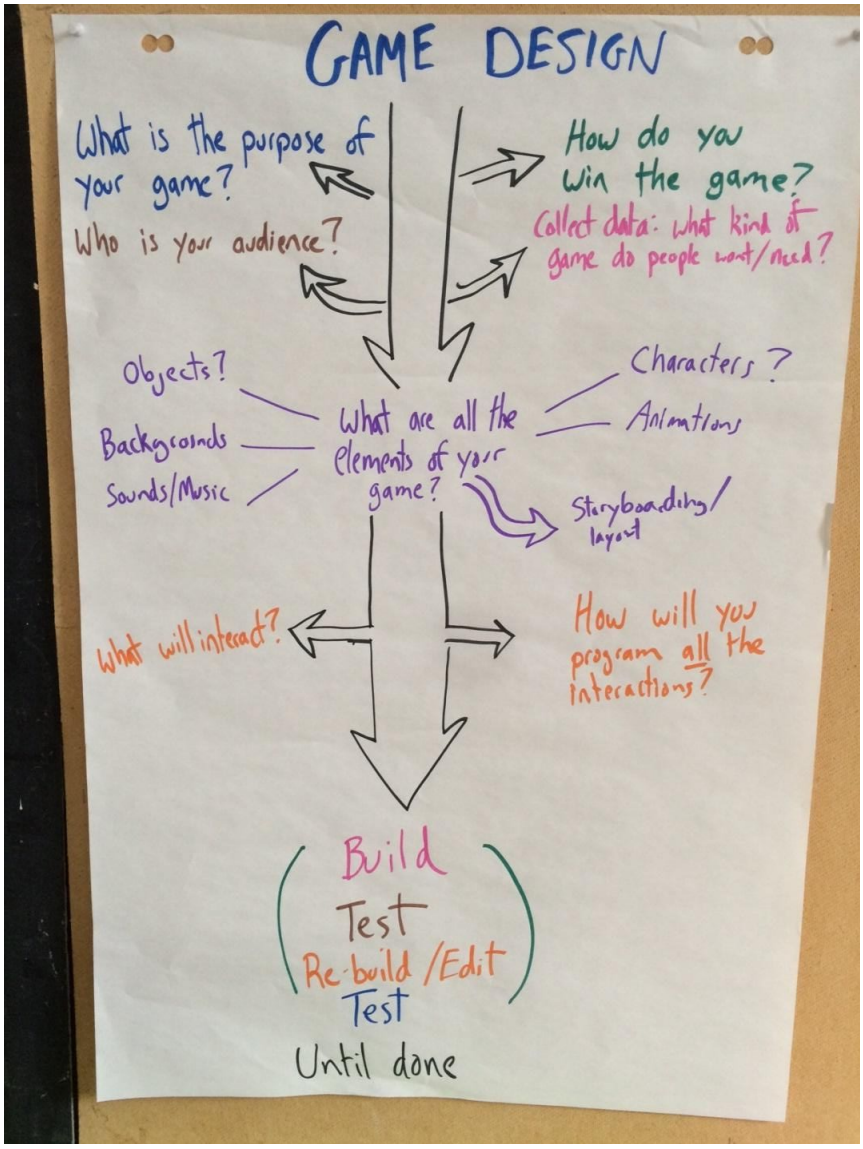
they were stuck, the first question I would ask is “Okay – what’s your next step?” The dialogue became about how students could independently find an answer. As I teach high school now, I employ the same methods, much to their frustration. They’ve been trained that all that matters is the answer and that the role of the teacher is simply to tell them the answer. Students will ask me how to spell a word, on occasion. “What might be a way you could figure that out without me?” Students that practice and reinforce independent learning in a wide variety of discourses will be more likely to use it in school. The fact that so many students so often are able to do it in video games shows that students can become owners of their own learning if only teachers are able to step aside to let them.

It is not always the teacher that presents roadblocks. I know that I was excited by the progress my students were making. It was important to me that while the students played the game in their pairs, that one was always trying to dialogue with the other – asking questions, making predictions, giving suggestions to solve a problem. This moved the non-playing student away from just passively observing the game to becoming an important partner that modeled the same strategies we were using for our conventional reading. I recall though one student who expressed frustration in class and showed and unwillingness to risk a wrong answer. I told her that I was surprised, because I had seen her work throughout the game and knew that not only was she an able risk-taker, but one that consistently succeeded as a result. “But Mr. King,” she said “That’s different. This will be on the report card.” If there is anywhere that game-based learning might have an impact on pedagogy, it might be in the move towards reading and writing as a process, rather than simply reinforcing traditional notions of assessment of learning.

I found that my idea had been successful. I talked with parents about it, and they too were pleased with what was happening in class. I was fortunate enough that the parent council of the school supported what was happening and gave me further funding to buy a second game – The Legend of Zelda: The Ocarina of Time. This was valuable as the fantasy story began to reveal itself more fully to the students, and they could begin to make connections between the two texts.

I wasn’t able to reach my goal that I hoped for the next year, which would involve students writing fan fiction. This perhaps seems like a silly, unrigorous bit of learning. As Duncan and Gee write in “The Hero of Timelines,” the concept of understanding a work so fully that you are able to write literature based upon it actually demonstrates deep skills in reading comprehension. “The Hero of Timelines” specifically discusses the Legend of Zelda series and the skill required to understand how the time-hopping narrative comes together as a cohesive whole. To understand what happens when and how a certain character would need to act at a certain point in a timeline and justify those actions is a tremendous skill.

All the while, this ran alongside our traditional language work, involving reading books levelled to specific student abilities and discussing our strategies for reading those books. The intent was never, ever, to replace traditional literature.



Creating Games

"You've got a Shovel! Now you can feel the joy of digging!" (The Legend of Zelda: Link's Awakening)

It's impossible to overstate the importance of creation in schools and the idea of schools as hubs of creation. Increasingly students live in a world of creation. The tools with which to create – not just pencils and paper, but electronics and equipment for production, become more affordable and commonplace. We are shifting from a culture of passive consumption to active production. Parents used to complain that video games would rot the brains of children. Fine! Now students are making their own games and sharing them across the world. I suspect though that discussing the importance of creation, to this audience, might be preaching to the choir.

To those parents then, who perhaps are even more flummoxed about their child participating in the creation of such brain rot, I can only say this: what skills do you need to create? At its core, it's a profoundly deep task.

It seemed only fitting to me that we would create a video game in our class. We had a time and a place to do it, and video game making software (conveniently named GameMaker) that was (perhaps most importantly) free. My initial idea was that this would prove to be a task tied mostly to skills in writing. In my mind, the skill set students would be utilizing most was related to their creation of a story, and then matching that story to the video game that they had developed and programmed. So, to those parents, I could say this: students wrote stories, or wrote down their ideas, and developed them into game. This is not too revolutionary though. It is encouraging, to be sure; students do not always consider themselves to be writers. We can at least say then that creating a video game allows students to tap into skills of creative writing. Like before, a teacher can then focus on transference of skills to other forms of writing. Parents can do this before. The language is supportive: "You're a writer. You wrote the story for a video game. Now can try writing _____." We don't want to create a society of video game developers. The intent is not to replace traditional writing. We want a society of writers, which can mean many things.

It was my surprise to find that developing writing skills wasn't the most significant skill that was developed during this process. One criteria of the game was that it should reflect the story you've written. If you say that the setting is a haunted house, the details of the setting you design should accurately depict that. It was eye-opening for students to realize that what they developed didn't match their plan. It wasn't intentional; they simply hadn't made the connection to their own writing. Seeing the visual result of their work allowed students to reflect on their writing and create better visualizations of their writing. There was a similar reaction to the tone of the game. If the game was supposed to be scary, it ought to do something that made the player scared. Many students found that their tone didn't initially match their intent. Some learned this after peers played the game and gave feedback on the game. More importantly, many students were able to identify the problem themselves. In short, developing the video games gave students an opportunity to become better editors. This is not an entirely similar nor dissimilar idea of revision that we consider when we write text. We come again to this idea of transference. Once students practiced skills in revision in a medium they were comfortable with and could demonstrate their abilities in, they were more likely to consider it and use those same skills in areas where they felt less comfortable or were less skilled.

Next Steps

"Who Is That Knocking At The Door?" (Morrison)

Whenever I bring up the need for a paradigm change in our schools and not just a touch up of its fading glory, I am told that the "stakeholders" (countries, states, policy makers, politicians, institutions, and elites) don't want it. But, of course, THAT is the point. The old order never invites the new order in. The barbarians always have to attack the gates. (Gee, 2015)

I think of this as I play the game Until Dawn. Until Dawn, loosely, allows the player to become a co-author of the text. Many choices in the game result in unique reactions, allowing for a vast number of possible outcomes to the story. Of course, the possible endings are still limited, but certainly allow more possibility than any individual book. Until Dawn demonstrates where many of our students already are,

and the amount of effort teachers will have to do to catch up to the way that students are encountering texts.

James Paul Gee knows this. As one of the preeminent writers of video games and learning, Gee has followed the research and teachings on this topic for decades. Writing for his blog in 2015, he's clearly frustrated. He describes the prevailing forces against change, and identifies that the way to achieve change isn't politely waiting; we must be the barbarians.

As someone who has worked with teachers, I know that "attacking the gates" is a strategy that we often desire, but rarely yields success. Yes, we need change urgently. Yes, our frustration leads us to demand action. However, there are no easy answers as to how to further these ideas. There is still great stigma around video games (not undeservedly), and teachers already grapple with so many initiatives and ideas in education without adequate training or preparation that to insist on a sea change is unfair to the teachers who practice as learners themselves.

The next step then is a baby step. We must continue to work as partners to each other in a learning community. We must share our ideas and give feedback on the work we're doing. We need to normalize the practice of using games in classroom. We cannot be barbarians. We must be what we have always been – teachers. We will teach. We won't storm the gates; we will knock on the door. Education is an invitation to learn, not coercion.

In class, now teaching high school, I invite my students to develop a way to teach essay structure to other students using the digital sandbox Minecraft. I teach students how to look for and consider details in reading and writing by using the interactive story-game Her Story. I normalize and legitimize games as texts. I teach skills for literacy, and I talk to students about transference. I'm a teacher, and I teach students how to learn.

Maybe we have to wait for the stakeholders, but students don't have to. Using transference of skills, they can go home and create better texts – video games or novels – using the skills taught in classes. They won't wait for stakeholders, and they don't need to. We couldn't keep up with them anyway. The key then is in transference, and showing students not about gaming but about creating and thinking of themselves as learners. Innovation isn't what we teach, but how we teach. As long as we keep that in mind, change will come, as long as we choose it.

As I said in the beginning, there's only one way this could have went. I planned out this chapter. I knew the ending. It was just like a book; you came along for the ride. But now here is where it becomes like a game. How can we work together to develop something? How can we be co-authors of education? John Ralson Saul details that innovation is a decision to make things work. (Saul, 2014) The stakeholders, whoever they are, may have made their choice – for now. In the meantime, what will be our decision?

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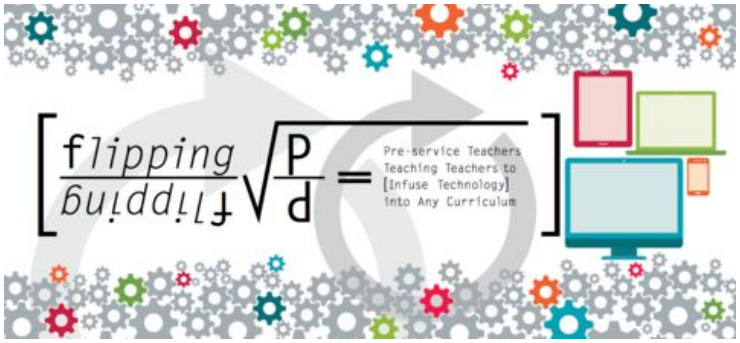
Devin King teaches English at a Winnipeg high school. He has presented several times on the use of video games in classrooms. His work has appeared in many digital and print publications, including newspapers, magazines and the Journal of Adolescent and Adult Literacy. He is pretty terrible at video games, but pretty decent at thinking about them.

Chapter 2 - Designing Technology-Rich Learning Environments in Teacher Education



This chapter is divided into three sections, co-authored by two pre-service teachers, Jessica Lister and Robert Porczek, along with their instructor, Eva Brown. Each section is written from the perspective of the individual author as identified at the beginning of the section.

1. Eva Brown, Red River College Teacher Education Instructor

Let's start this learning from the beginning. The education system as we know it today, was designed for industrialization, a model that followed assembly line procedures to produce quantity. The industrial age is past, and now in the 21st century, we live in a knowledge-based economy. This means that students need to learn how to be creators of knowledge rather than merely consumers of knowledge (Dede, 2010). Students need to have learning opportunities where they can learn how to create knowledge, practice this creation, and truly experience the learning. Education environments must change from an I tell you and you tell me back and you pass phenomenon, where students may not actually understand what they told you back, but they did and so they get a good grade! Change in the way we teach and learn requires a shift in thinking. "This digital world calls for changed mindsets about schooling, teaching, learning, and assessment" (Jacobsen, 2010, p. 1). Education has not, however, kept pace with the vast changes to reflect what and how students need to learn. Professional development is ongoing, as it should be, for in-service teachers to be able to provide relevant learning opportunities for their students. A good beginning for this reformation in education is in teacher education where pre-service teachers learn how to teach. Pre-service teachers must also experience the learning that they will be expected to teach their students in their future classrooms. Modeling this learning is essential. Teacher educators need to be actively involved in professional learning networks and other learning opportunities to be able to provide relevant learning opportunities for their new teacher candidates. Engaged and skilled teacher educators are needed now more than ever to

model the teaching and learning for pre-service teachers. Teacher candidates must have learning experiences that allow them to acquire skills to design learning environments that enable their students "towards the deeper conceptual understandings and core competencies that allow them to reason about real-world problems, critically analyze information, and engage successfully in 21st century work" (Jacobsen, 2010, p. 2). Experienced and new teachers must be prepared for future learning environments to provide students with learning that is needed for today and for the future.

The traditional classroom has shifted from a teacher standing at the front of the room lecturing to the students, to an environment where the teacher and the students are all involved in the teaching and learning. Often through the use of technology, students can become creators of their own learning. They can become more competent in their abilities to think critically and inquire about things with an open mind. Students have the ability to take a device, an object, an application or a problem and independently analyze, discover and solve any questions they may have. By teaching students about digital citizenship, and the most effective and efficient ways to use technology, teachers have embraced the imaginations and mindset of students to use technology for the greater good. This aligns with Manitoba's policy and vision outlined in the Literacy with ICT K-12 Continuum (Manitoba Education, 2006) that emphasizes learning that develops critical and creative thinking, ethics and responsibility and ICT literacy. The Continuum is based on supporting principles that include: (i) inquiry, (ii) constructivist learning, (iii) higher-level critical and creative thinking, (iv) reaching deeper understanding, (v) gradual release of responsibility, (vi) digital citizenship, and (vii) multiple literacies for the 21st century.

Technology is growing at an astonishing rate and it is becoming increasingly more accessible to students (Nutbean, 2013). As technology use continues to grow, the power structure of the classroom is shifting away from the teacher toward the students. Almost every student anywhere can be found with some sort of mobile device that provides access to collaborative spaces, social media and the internet at their fingertips. It is important, however, that teachers become technologically fluent so that they can make decisions for the appropriate use of technology or whether or not to use any technology for the learning that is needed. Teachers can promote inquiry-based learning where students take the onus for their own learning and teachers assist students in authentic learning. Schools are increasingly becoming BYOD (bring your own device) schools where students can use their mobile devices for learning. As technology use continues to grow, educators will see a continual shift in the power structure from teachers to students.

Red River College pre-service teachers (RRCTEd) are provided with learning opportunities to help them to design and experience learning environments that align with Manitoba's policy and vision. RRCTEd students prepare lesson plans with the focus on the pedagogy and include the technical aspect of using various technologies (OECD, 2010). Several such projects are outlined in this chapter. Resources and more information is available on the website, http://flippingpd.wikispaces.com/.

RRCTEd students shared their learning with K-12 teachers at the Duke of Marlborough School in 2015 in Churchill, Manitoba. We partnered with the Frontier School Division (FSD) to fly to northern Manitoba where teaching and learning was streamed live on a global scale. FSD presented a panel of experts to allow participants to gain a glimpse of a northern environment. RRCTEd students provided professional development to the faculty of the Duke of Marlborough School sharing designs for teachers to learn how to incorporate collaborations such as Mystery Skype, Google Hangouts, social media in education and augmented reality opportunities for learning.

There are many benefits, beyond learning a new device, to the approach of pre-service teachers teaching teachers. Experienced teachers ask questions that they anticipate they will encounter as they begin to infuse technology into their teaching, which affords RRCTEd students the opportunity to explore solutions to these questions that they would not have had if they only practiced their lessons with their peers. Teacher education programs do not generally provide opportunities for teacher candidates to share their learning with in-service teachers and other educators. This partnership has proven to provide rich learning for both pre-service teachers and in-service teachers in the classroom.

Pre-service teachers bring enthusiasm to the sessions, which becomes infectious, often energizing the teachers as they continue on their journey as lifelong learners while also providing both groups with a space to grow their learning network.

RRC Teacher Ed Mystery Skype

Pre-service teachers at RRC present a day of professional development each year at the annual MTS PD Day (formerly known as SAG, SAGE). Students are affiliated with the ManACE and EBIT special area groups and present sessions at one of these events. This again provides the opportunity for the pre-service teachers to experience the learning, and work together with in-service teachers, growing their professional learning networks and confidence to share their teaching and learning. Other learning opportunities have included moderating the MBEdChat, a Twitter chat organized by Manitoba teachers, and presenting at ManACE TIN IGNITE sessions. Students have also presented sessions at the ISTE Conference (International Society for Technology in Education) in Atlanta, GA (2014), and Philadelphia, PA (2015). Please be sure to check out the website that includes information from these and other opportunities - http://flippingpd.wikispaces.com/.

2. Jessica Lister, Red River College Pre-Service Teacher

Today our world is shifting and evolving more than ever. We have become a society that relies on efficiency, productivity, collaboration, problem solving and critical thinking. These are the skills that are essential for future generations. These are also skills that are included in the Literacy with ICT K-12 Continuum that Manitoba Education (2006) includes in their policy and vision. We have pushed passed the idea of industrialized education that relied on memorization and standardization, and are immersed in a knowledge-based economy.

These are things you probably already know because people are talking about them all the time. But it makes me wonder… if that is the case, then why are we still teaching the way our parents (maybe even grandparents) were taught? Is this method of teaching really suitable for our current state of society and digital world? We will teach the way we were taught.

The traditional classroom is shifting from a teacher standing at the front of the room lecturing the students, to a more diverse environment where the teacher and students are all participating in the teaching and learning. However most of us teachers and teacher candidates have experienced direct lecture when we were in school, so it is no surprise that the majority of us fall into the ritual of doing what is familiar to us.

Through the use of technology, students may become creators of their own learning. They have become more competent in their abilities to think critically and inquire about things with an open mind. Students have the ability to take a device, an object, an application or a problem and independently analyze, discover and solve any questions they may have. By teaching students about digital citizenship, and the most effective and efficient ways to use technology, students may embrace their imaginations and mindset to use technology for the greater good.

I have witnessed what students are capable of creating when given the opportunity to integrate technology. Last year I taught a career development course and one of the learning outcomes require the students to create a portfolio to showcase their work. This type of project has commonly been done using a binder, but I thought why should we be restricted to a static format? How could this be more interactive and relevant to the expectations of today's workforce? It occurred to me that I should have my students create an ePortfolio.

After discussing this with the administration, they agreed to allow this if the students did not publish their portfolio. Once I got the approval, we went straight to work. I had the students use the free website builder called Wix, where they were able to create an online electronic portfolio. The students then spent the next several weeks working on their ePortfolios, and the results were amazing.

I have never seen students so eager and excited to work on a project before, and I believe what caused this excitement was the fact that they were able to use the technology and skills with which they were familiar. They could personalize and customize their ePortfolio by adding images, animations, sound, colour, backgrounds, videos, links, slideshows, and more!

The students were so focused and engaged every single day we worked on this, and I was able to see their creativity that I might not have seen if I simply had them use paper and a binder. This was definitely one of my most memorable moments, and it reassured me that technology can be used to deepen my students learning.

It's experiences like the one that I have described that excite me about becoming a teacher. I will be able to influence the learning of my students in a positive and exciting way. I have learned how to infuse technology effectively in the classroom by using a number of different apps and resources, and I wish I could have experienced this when I went to school as a child.

I grew up going to school in an age where teachers and administrators frowned upon the use of technology. We were not allowed to use technology on school grounds at all. We were restricted to the textbooks and resources only our teacher approved of. I do not want to be that kind of teacher.

I want to be the kind of teacher who allows students to use a number of resources and technologies of their choice. If it will enhance their learning, then why not? There is a whole world out there with resources and opportunities to explore, and we now have the technology available to access it.

Students should be ALLOWED to access it. Why are we restricting them from using the tools they are most familiar with, and why are we restricting them from having access to a better education?

Our education system is still relying on using methods from the industrial age, such as memorization, copying notes word for word, and using the same old resources from fifty years ago. Uhh… NEWS FLASH! We are no longer living in an industrial society. Our society (and the rest of the world) has evolved to more technological advances, so why hasn't our education system? As Sir Ken Robinson has said, "one of the roles of education is to awaken and develop these powers of creativity. Instead, what we have is a culture of standardization".

I am excited to become a teacher who breaks out of the rut that our education has been stuck in for the past however many years, because it's time for something new! The past is in the past for a reason, and it's time we look to the future of education. I want to use technology in a way that will expand my student's knowledge beyond a boring textbook or classroom walls, because realistically… there is a whole world out there waiting for them to explore.

3. Robert Porczek, Red River College Pre-Service Teacher

As an after-degree student, I have experienced two different types of post-secondary education. My first post-secondary experience was at the University of Winnipeg, where I graduated with a Bachelor of Physical and Health Education. This degree was designed for individuals who planned on joining the education program after graduating with a major in in kinesiology. I learned about topics in kinesiology and how to teach a variety of sports. During my time at the university, I was required to use very little technology. As a millennial and a kinesiology major, I assumed that I already knew enough about technology to provide future generations of students with the best learning available. After spending two years at Red River College, I realized how little I actually knew about technology before entering the teacher education program. The Business/Technology Teacher Education program helped me see a wide variety of techniques and methods to enrich student learning by infusing technology into teaching and learning.

The literature supports that infusing of technology, such as Web 2.0 applications (social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, and mashups), can enhance the customization of the learning process, which can help educators adapt teaching to the particular needs of all students (OECD, 2010).

Every student entering into the school system today is considered a digital native because they have grown up during the technological boom. In school, you will see students on their phones, iPad, and computers at any given time so why bother teaching students how to use them. Parents, teachers and people in the teaching community assume that the younger generation knows how to use technology to its full capabilities, but they are mistaken. Most students are unaware of the repercussions that their posts on social media can have. Students need to be taught how to use these tools properly to use them to their full potential. While in university, I used social media sites such as Facebook and Instagram connecting and talking with friends during breaks but it never occurred to me that social media could be used to expand and share my learning.

The opportunity to use social media to grow my knowledge occurred during my studies at Red River College, where I participated in Twitter chats, created an Instagram account, where I shared my learning, and joined a variety of PLN (professional learning networks) like Symbaloo, Twitter, Instagram, Google+, and Scoop-it. One valuable lesson that I learned while in my teacher preparation program was about digital citizenship and the importance of keeping a clean digital footprint. Like most students, I would post, share and comment on a variety of things on social media without considering who could possibly see what I was doing. As a future educator, learning how to keep a positive online profile was a vital lesson. I will be a role model for the future generation of students entering the school system so it is important to be a good role model. Now employers are flocking to social media to find information on their future employees, but young people are often unaware of the consequences and impact that their posts can have on them and their futures.

During my time at Red River College, I had the opportunity to experience microteaching lessons in an actual high school classroom. Usually microteaching is done at the college in a controlled environment in front of peers. During my microteaching, I had the opportunity to teach three different courses: Visions and Ventures, Digital Photography, and Lifeworks. This created authentic learning opportunities that I would not have experienced teaching to my peers. I taught my lessons at FRC (Fort Richmond Collegiate). During my microteaching, I saw the opportunity to apply what I learned about digital citizenship and digital footprints from Red River College and translate it to teaching students in the Lifeworks class. These students will be entering the workforce where they will work for various companies to acquire work experience. It is important for students to identify and practice the skills, knowledge and attitudes used in preparing personal marketing. The main topics I covered during my lessons with the FRC students were the effects that social media can have on employability, what a digital footprint is, and how employers are using social media for interviewing and hiring employees.

The first activity I implemented helped students understand the variety of people that can actually see what they posted by calculating their digital footprint. Students checked sites on their mobile devices to see their latest postings on a social media platform. They then multiplied that post by the number of friends that they currently had in that platform. Once they calculated that number, multiplied that number by the number of friends that their friends had. They repeated this process one more time with the number of friends one of their friends had. From this exercise, I had students reach numbers in the millions! This showed students the number of people who could potentially see (or forward/share) what they posted online. Students watched a video about a local politician running in the provincial election but was asked to step down due inappropriate comments he made back in 2012. Students brainstormed and discussed what should and should not be posted on the Internet. To gain a deeper understanding of how employers view social media site, students analyzed the profile of two potential employees. They had to choose who they would hire. Students used Web 2.0 technologies (blogs) to create a positive online brand for future employers to see. In these two lessons, students had the opportunity, as I did at Red River College, to learn how to responsibly use technology such as social media and other Web 2.0 tools to develop a positive online image.

Technology is a valuable tool that can have a huge effect in schools that fully embrace the idea of infusing technology. HGI Middle School (Henry G. Izatt) is unlike most schools because it is a BYOD school which promotes staff and students to bring their own technology devices into the classroom. I had a chance to visit this school to see how students addressed digital citizenship, to observe different ways to achieve learning outcomes, and to learn about the positive power of social media. While at HGI, I

observed a physical education class using technology to improve students' learning. An application, Ubersense, was downloaded to iPads and distributed to students to use while learning how to play basketball. The app allowed students to take videos of each other and to slow down the video to allow students to observe themselves and develop a deeper understanding of their form as well as helping them to correct mistakes that they were making. This application is a great opportunity to use the benefits of technology in a course which is heavily reliant on physical activity, to improve the learning.

We cannot wait for the opportunity to start our journey to integrate technology in the classroom. It is important that students learn to use technology such as Web 2.0 apps and social media to improve their ICT literacy, ethics, responsibility, critical and creative thinking. Our world is digital, and it is constantly evolving. As educators, we are responsible to keep changing and expanding our knowledge in order to teach our students with the most current and effective resources and methods. Don't we want them to succeed in all areas of life? We should be teaching them how to learn, a lifelong skill, and in today's business world technology is huge! We should be teaching them how to incorporate this technology into their assignments, and assist them with pursuing their aspiring careers. It just doesn't make sense to that we are still trying to teach for the industrial age. **Let's get innovative and teach effectively in the digital age.**

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Resources/Websites

Eva Brown Blog – https://ebrownorama.me/

FlippingPD Wiki – http://flippingpd.wikispaces.com/

Henry G. Izitt School – http://www.pembinatrails.ca/henrygizatt/

Jessica Lister Portfolio – http://mslister12.wix.com/mslister

Robert Porczek Portfolio – http://robporczek.wix.com/mrporczek#!home/mainPage

RRC Mystery Skype - https://youtu.be/jMGtVgXzc3U

Sir Ken Robinson – https://youtu.be/wX78iKhInsc

ISTE Conference - http://www.iste.org/

Eva Brown, Teacher Educator

Eva Brown is a passionate teacher educator at Red River College, in Winnipeg, Manitoba, Canada. She has over thirty years of teaching experience in various disciplines at the junior and senior high school level, and in higher education. Her focus is seeking leading and learning opportunities for her students and herself that will impact education. Eva is currently completing the Doctor of Education program in the Werklund School of Education, University of Calgary. Her studies are in the Learning Sciences: Technology. Eva demonstrates her strong belief that educators must model their learning to their students. Her research interests include designing learning for technology-rich collaborative learning environments and the development of research skills in new teachers so that they can become teachers as researchers. Her approach is pragmatic using design-based research.

Jessica Lister, Pre-Service Teacher

Jessica Lister is a pre-service teacher who is passionate about instilling lifelong skills in her students. In 2014, Jessica obtained her Bachelor of Physical and Health Education degree from the University of Winnipeg, and is now currently in the Bachelor of Education after-degree joint program with the University of Winnipeg and Red River College. At Red River College, Jessica is pursuing her second teachable major in business and technology. Through the use of technology, and her efforts to use inquiry and project-based approaches, she aims to provide her students with the fundamental skills needed for today's digital age.

Robert Porczek, Pre-Service Teacher

Robert Porczek is a pre-service teacher in his final year of the Business and Technology Teacher Education after-degree program at Red River College and the University of Winnipeg. He graduated with a Bachelor of Physical and Health Education degree majoring in kinesiology prior to enrolling in teacher education. Robert looks forward to teaching, especially in both business and health, and to make a difference so that students can improve their health while guiding them to unlock their true potential.

Chapter 3 - Living out the Promise of Technology: Computers and Cell Phones for All at Dakota Collegiate

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Introduction: Looking at the Promise(s) of Educational Technology

Promises, promises, promises. People who make promises make assumptions about how circumstances might change over time. Promises of all sorts are very important in culture, as people make agreements in the present that help them to navigate into uncertain futures with at least a few ideas about how things might change, or remain the same. We teach children to make promises, to keep promises, and that breaking promises is to be avoided. Making promises also suggests that it is somehow possible to influence future events, and to provide a sort of guarantee about how things might turn out.

Also, when someone "shows promise", the word is used to identify potential. For example, first-round draft picks in any major sports league "show promise" and so they are highly desirable in the draft. Education technology persistently "shows promise", in part due to promotional advertising by commercial interests wanting to sell their products (Toyama, 2011). However, the idea that learning is easier and more interesting is the generally assumed promise of education technology.

Often times the promise that people see in educational technology actually works out the way they hoped, even if there are difficulties along the way. As with first-round draft picks, those who "show promise" often work out well as time goes by. Showing promise is, after all, only the start. Recognizing potential, working hard, being fortunate, and having an organization provide steady, ongoing support all contribute to realizing the promise over time.

In 2009 the Louis Riel School Division (LRSD) Information Technology department and the Principal of Dakota Collegiate began to seriously consider the promises made by educational technology. At that time an obvious cultural shift toward laptop and handheld cell phone computers was well underway in Manitoba and elsewhere, and educational technology looked to have great potential as it became ever more accessible. From that time until now, all of the people connected to Dakota, including students, parents, teachers, educational assistants, clerical staff, administrators, board office personnel and the LRSD school board, have cultivated a much stronger connection to educational technology by launching and sustaining Manitoba's largest public school, bring your own device (BYOD) initiative.

As a concept, a mandatory BYOD culture in a public high school "showed promise" in 2009, but there was no real way to know how things would turn out. It was a radical proposition at the time, and took some bold planning, commitment, and trust for all involved. Seven years on, we are continuing to live out the promises made by educational technology at Dakota Collegiate. The growth of the concept, its development over the years and the way it is spreading to LRSD high schools is proof that a public school BYOD program is practical and workable. Furthermore, it also fosters learning in deeper, faster and more connected ways than what was possible at the school prior to 2009.

What do you hope to achieve with a BYOD High School?

In a mandatory BYOD program, students are expected to bring their own computers to school every day, and they can expect to use them every day. The computers are owned by the students, not the school or the division. Daily use means that teachers expect students to have the machines on hand, and lessons are prepared that require computers.

All kinds of hurdles emerge immediately; what if students come unprepared? What if they use their machines inappropriately? What if teachers are uncomfortable or unfamiliar with the new tech? All of these are valid concerns, and good planning with support (money and people) will address most of the problems. Additionally, it is worth pointing out that the same sorts of problems occur in most schools all the time. Students might come unprepared at any school, may not act, read, write, or create in ways the school deems appropriate, and teachers have to continually adjust to become familiar with a rapidly changing world.

Beginning in 2010 at Dakota, three main goals emerged from staff and leadership discussions that we hoped to achieve by beginning and supporting BYOD at the school. These were also the goals that were presented to the LRSD school board when the Superintendent sought board approval for a BYOD pilot in February of 2011 (LRSD, Minutes).

Firstly, *we hoped to assert the place of public schools as the appropriate venue for learning about the internet*. Schools that exclude new technologies are telling their students and their families to go learn about all of that stuff somewhere else, and so they do. When schools forbid the most common tools of communication used in society they fail in their mandate to prepare young people for active and responsible citizenship. Families need support as they teach their children, the first digital generation, (Tapscott, 2008) how to navigate the digital and online world.

While it is true that nobody has a lock on how best to learn how to use and interact in digital networks, it seems odd and irresponsible to think that public schools would arbitrarily exclude these new forms of communication. Imagine if previous generations had excluded the technology of books or chalk boards or moving pictures from schools; students would still have learned, but to a lesser degree and in a way that would not have reflected the world around them. At Dakota, the hope was that we could better serve and better reflect the community by expecting daily, infused (Manitoba Education, Impact) information and communication technology exposure in a guided and supported learning environment.

Secondly, *we hoped to help students to get better at using these new technologies and also learn how to care for their computers in a community of info-tech users*. Dakota is a large high school with between 1100 and 1250 students in any given year. When young people are at Dakota, they are surrounded by many different kinds of people from around the world, all who are working to complete their high school education. While we often focus on the differences and the uniqueness of individuals as learners, all individuals learn much from being in community with one another in the library, in the cafeteria, and in the classrooms. In all of these places, students are seen using their computers and phones every day, and this becomes the accepted community standard.

Since it is so common to see people using their computers, there also grows a sense of shared responsibility for each other, and the electronic tools being used. By analogy, while not every driver on the road is considerate in how he or she drives, all drivers work together to amplify logical and reasonable

"rules of the road" that are both written and unwritten. At Dakota, students benefit from learning in a school culture that expects computer use, and together, people help one another to be safer, wiser, better computer users. The "driving" analogy works: when driving, things are usually fine on the road because many people (each motivated by self-interest) cooperate so that the entire group can benefit. At Dakota, cell phones and computers rarely go missing, in part due to the school culture that promotes the ubiquity of electronic devices. Since computers are not rare, they are also not exotic or seen as disproportionately desirable to the few students who may consider thievery.

Also, friends help each other out, and remind each other about their phones and computers, which helps even the less responsible students do a good job of keeping tabs on the whereabouts of their machines. This is only one example of the ways students learn better together, and how working with technology together is making them better and more responsible tech users (LRSD, 2015).

The third goal of the Dakota BYOD initiative was that *we hoped to enhance the learning and teaching processes by making the digital world easily accessible to teachers and students.* This is the perennial hope of those looking to "fix education" through new tools. However, expecting any technology to measurably enhance learning is a bit of a stretch. Did whiteboards make teaching and learning better in schools? How did the inclusion of the overhead projector improve learning? The adage that "better tools do not a better tradesperson make" seems to apply here.

While it seems true that better tools should make it easier to teach and learn, this is not always the case. Learning and teaching are complex outcomes of receptivity, intellectual ability, content transmission, creativity, relationship, and yes, technical tool use as well (Davis, B., Sumara, D., & Luce-Kapler, R. 2015). ICT use in class is doomed to fail if teachers only employ old methods combined with new tools. Sometimes older methods of teaching do not mesh well with the use of new tools, and students miss out on the greatest learning potential because the new tools are used only in the old ways. Seymour Papert (1980) aptly sums up the problem this way:

> The phrase, "technology and education" usually means inventing new gadgets to teach the same old stuff in a thinly disguised version of the same old way. Moreover, if the gadgets are computers, the same old teaching becomes incredibly more expensive and biased towards its dumbest parts, namely the kind of rote learning in which measurable results can be obtained by treating the children like pigeons in a Skinner box.

Having new tools only helps if teachers employ new techniques and accept new pedagogies as well. This is just as true and challenging for the staff at Dakota as it is for any progressive school that is trying hard to improve and innovate.

Fortunately, the impact of excellent teaching is also amplified by effective use of tech, and this has been the experience at Dakota. As teachers have been continually involved in their own professional development to learn how to use the new technologies they have been able to become excellent at bridging tech use within their content domains, which is leading to enriching learning experiences for students. In fact, many Dakota teachers have become so proficient with the use of educational technology that they are frequently asked to present to teachers at a variety of professional learning opportunities.

To hope that new tools will improve learning is futile if teacher capacity is left out of the equation. This was known at the outset of the Dakota BYOD pilot, and teacher professional development began immediately, with the formal PD days in the school year, but also with the voluntary, extra time,

informal learning that many teachers did on their own as they sought to understand the massive changes that were underway.

Far from being luddites, the teaching staff at Dakota in 2009 already used a great deal of technology in their personal and professional lives, but the BYOD pilot provided the impetus to learn more, and to grow. The initial hope of enhanced learning through employing educational technology is continuing to be realized at Dakota, and every year new students and new staff are introduced to the learning culture at the school that assumes technology use.

Taken together, the hopes of the initial team of school and division leaders matched well with the promise shown by information and communication technology (ICT), and in 2009 it started to become more than just a hope and a promise. However, it is important to note that all such initiatives begin with these sorts of hopes and promises. To recall the sports analogy, a draft pick that "shows promise" has the potential to fulfill the hopes of an organization wishing to succeed. Those initial hopes and promises are immaterial, but necessary, and are based upon mutual trust. Hopes and promises also force people to look forward into an unknown future, with the intention of drawing an improved present from their current ideas about possible and preferable futures.

From then to now: BYOD at Dakota, 2009-2016

In November of 2009 the Principal of Dakota and the head of the Information Systems department for the Louis Riel School Division began discussing the possibility of increasing ICT use at Dakota by having every student use a computer in class as often as possible. Laptop carts were becoming more affordable, and the "netbook" computers also meant that they took up less space in a cart or on the desk of students. The technical possibility of having a computer in front of every student was becoming a practical reality. The phrase "one to one" indicating a ratio of one computer per student was introduced.

In the very early days of the discussions there was a great deal of fluidity about what the benefits and problems might be and how it might be possible to develop a way of learning that involved ICT to a much greater extent. The discussions led to a plan to develop a school-level steering committee made up of teachers who would research possible options and to see what was already going on in order to find a way forward. Two teacher-leaders were invited to head the steering committee at Dakota, and staff were invited to join if they had an interest.

By April of 2010, the committee was formed and got off to a quick start in May by visiting two school districts in Arizona that had developed "one to one" schools, where every machine was owned and managed by the school district. These early examples and the literature review done by the committee led us to wonder how such a model could work at Dakota, with the limited finances and aging infrastructure of the school building.

After the Arizona trip, the committee got down to work, developing possible roll-out plans and engaging in conversations with teachers who were beginning to wonder how big and how strong the will was to make significant changes at Dakota. In the final in-service PD Day of 2009-10, the staff at Dakota spent a day looking at models of ICT assisted learning, which mostly went by the title "21st Century Learning" (Trilling & Fadel, 2009). The school year came to an end, but through the summer plans continued for a roll-out of a limited 1 to 1 program in September.

The 2010-11 school year saw massive changes at Dakota. There were clearly much greater challenges to face than simply deciding which computers to buy, so the initial steering committee was expanded and budded into several sub-committees that each had a research and policy development mandate. Separate sub-committees were created for Infrastructure, Pedagogical Models, Digital Citizenship, Professional Development, and Software Applications. Each committee communicated with the others and were coordinated through the school administration team, the initial advisory committee of teachers, and the Information Services department of the School Division. By December of 2010 approximately 20 teachers were actively involved in committee work to develop a "one to one" program at Dakota. This group of 20 was supported by the 4 school administrators and the board office staff overseeing Information Systems.

The use of laptop carts grew rapidly in the autumn of 2010. The new wifi system in the building and arrival of six new netbook carts each housing 24 small computers were the first tangible signs that a change was underway. Early on the school administration decided to allow the netbook carts to be used almost exclusively by a few teachers in order to pilot the idea of ubiquitous usage, and not water down netbook availability by having them housed in the library and taken out by teachers, as though they were a typical AV school supply. The few teachers who got exclusive use of the carts were expected to use them every day, to learn, and to report out how that worked to the committees and to the staff. The goal was also, in part, to have those teachers and their classes share their experiences with other teachers in the school in order to develop staff capacity at combining traditional pedagogies with ICT in a "21st Century" way.

A third important front of school development beyond committee and computers had to do with the realization that scaling up the initiative in the way it was originally envisioned would become impossible. At the time in 2009 there were approximately 1200 grade 9-12 students at Dakota, and there was not enough funding for the LRSD to buy and maintain 300 netbook computers if "one to one" was the goal. Through committee discussions and a site visit to Sansome Middle School in Edmonton in November of 2010 it became clear that the only scalable solution was to have students bring their own computers to school, and to provide robust internet and wifi, along with divisional and school level paid subscription resources and software for students and teachers. The decision to move to a "Bring Your Own Device" (BYOD) model was the third important decision making strand that happened in the autumn of 2010.

After the LRSD School Board approved Dakota's 1 to 1 BYOD plan as a pilot project (LRSD, minutes) the initiative was presented to several parent groups, including the K-8 parent advisory councils for the schools who send students to Dakota after grade 8. Most of these groups were receptive, with a few vocal exceptions among individuals. Concerns about the pilot were varied; some viewed the cost of a computer as a prohibitive burden, some were concerned about theft or damage to the machines, while others concerned with how students and teachers would mediate learning through the new machines.

These concerns were addressed by school and divisional administrators alike. Families who could not afford machines could borrow them a semester at a time and security stickers with tracking numbers were provided by the division for any machine. The philosophical and pedagogical concerns were addressed variously, but usually with the idea that the new tools would be used to leverage learning by increasing engagement, and by providing the resources of the internet to each student and teacher on a daily basis.

Making sure that the community understood the pilot and could see the benefit of having more access to current technology in classrooms was a critical step in beginning the project. Thankfully, most parents could see how information technology was changing their own workplaces, and so they readily supported the pilot. The clearest proof of parental support was, perhaps, that families did go out and buy computers that summer, and they told their children to bring them to school, just like other school supplies.

Grade 9 students began arriving, computers in hand, in September of 2011. In September of 2012, all grade 9 and 10 students were required to bring their own computers, and many grade 11 and 12 students took up the practice voluntarily. The first class to graduate having taken all four years in the BYOD 1 to 1 program was the class of 2015.

As the 2015-16 school year draws to a close, computers and cell phones are used in every minute of every school day at Dakota. Students accept this as the only form of 9-12 education they have ever known, while the older generation remembers that school was not always like this. Dakota is very different from other schools, but those differences are deeply embedded in the classroom learning. From the outside, Dakota presents as a typical large suburban high school. Almost all families are supportive of the BYOD 1 to 1 program, and view it as a way to ensure that children keep in step with innovations in the workplace and postsecondary education, where the use of smartphones and computers has also blossomed over the past seven years.

How has BYOD Changed Dakota Collegiate?

When people tour Dakota to try and understand how BYOD works they are often surprised by how much of what is going on in classes seems very recognizable. Students are talking, working on assignments, there is a task or set of tasks to accomplish, and a teacher is there to both guide and instruct. Students are still in classrooms, they use desks, and there are still binders, paper, pens and pencils all about. I have had the opportunity to lead several guest tours over the past seven years, and the dominant impression that people get from the outside looking in is just how little seems to have changed. Guests will point out that, yes, there is a digital projector in every room, and that most students have at least one or two screens in front of them, but the technology does not trump the humanity of the educational process (Metcalfe, 2013). Young people still interact with each other and a teacher. They are learning in groups, they visit with friends in the hallways, and they like to study in the library.

At Dakota, teachers use many kinds of software to deliver lessons and accept assignments. Currently many teachers and students use Microsoft OneNote as a repository for lessons, and also as a collaborative online space for students. For example, a teacher might ask every student in a class to access the OneNote page for the daily lesson. Students are able to access the lesson on their own machines and the teacher can simultaneously show the page using the digital projector. Using OneNote for lesson delivery and for the creation and submission of assignments has been very successful in the Math, English, and Social Studies Departments at Dakota.

Another popular software option that the school has purchased is access to OxfordNext, which is a digital and multimedia presentation published by Oxford University Press. OxfordNext provides digital access to a few of the plays of William Shakespeare that are most commonly studied in high schools. Dakota buys licences for students to access *Hamlet*, *Macbeth*, *Romeo and Juliet*, and *A Midsummer*

Night's Dream. The OxfordNext versions include the play text with interactive notes, a full version of the graphic novel, a full version of a film version of the play, several built in quizzes for each scene, and a complete audio version of the play as well. Students using OxfordNext have to log in using their school division credentials, and then they have access from anywhere; at home, school, or on the move as long as they have internet access. The strong advantage to OxfordNext is that it increases the chances that a student can find several ways to help comprehend the play beyond relying on the margin notes or the lecture of a skilled teacher. By seeing it played out, hearing it, comparing cinematic and stage presentations and also reading the text a student can learn more about the play in the finite amount of time allowed during the semester. Also, students continue to have access to the OxfordNext plays for the duration of their time in high school, so they can compare and contrast works without having to access paper copies of the play. Overall, the teachers have made good use of OxfordNext and the students generally prefer using it over the paper copy when given the choice.

BYOD has changed Dakota since it has opened up many options for learning and teaching that were otherwise unavailable or not approved. Students are encouraged to demonstrate their learning in many ways, and teachers are challenged to keep up with the learning choices and options that they learn about from their colleagues and their students. In fact, BYOD continually challenges traditional notions of what learning and teaching need to look like. Perhaps the most obvious example of how BYOD has quietly transformed Dakota Collegiate is evident when you visit the school library.

The library has changed greatly over the past 5 years. At the outset, students were forbidden to bring "electronic devices" into the library. This was a throwback to the days of portable cassette players and mp3 players. The library was a place for books, and there was a bank of student computer terminals that students could use if they wished.

Today, the computers are still there for student use, but the collection of books at the library has been thinned out to make way for more adaptable learning and collaborative spaces in the library. Students use all of their own devices (cell phones, computers, and if they wanted, a WalkMan would be ok too) in the library, and they access the high quality wifi available to them as well. "Electronic devices" are now expected and encouraged in the library, just as they are in classrooms.

The library is transforming into a learning commons, and is no longer a gated space for the storage and consultation of reference books. The security gate to keep the books from being stolen has been removed completely. BYOD has meant great change for the library, and yet the importance of a highly qualified teacher librarian has never been greater. Students and teachers alike benefit greatly from the breadth and depth of knowledge provided by a qualified teacher librarian at the academic heart of the school.

For some, the changes in the library are sad, because those of us in the older generation can be sentimental about books. I can include myself in this camp, and my own bookshelves at school and at home are proof that I like books. But learning and knowledge are no longer the domain of books alone. In fact, more information and better learning resources are available online, and so libraries should change. Otherwise they no longer serve as dynamic places of learning, but rather as book museums that tell of how people used to learn in previous generations.

Part of the strength of the BYOD program has been a willingness to try new things, and to allow teachers the freedom to develop their online courses while also providing resources and guidance. Early on, the LRSD provided a SharePoint based Learning Management System (LMS), but the system was difficult to learn and had limited uptake with teachers. Recognizing this, the IT Department developed

other course management options using customized portions of Microsoft OneNote, SharePoint MySites and SchoolBundle to provide teachers with robust tools that encourage a common approach to course management. Since teachers and students meet in class daily, there is less need for an LMS such as Blackboard or Desire2Learn, which are well suited to distance delivery situations.

The LRSD IT department has continued to demonstrate flexibility and willingness to listen as the software and practices of teachers have continued to change and grow over the past seven years. What has grown is a highly heterogeneous network of human knowledge and computer use, and since many people accomplish the goal of learning in many ways, the system is stronger due to its diversity. If one particular solution won't work, teachers likely know another way to accomplish the task, or the IT department can help to solve the issue and get things working again. The decision early on to be "device agnostic", that is, to accommodate as wide a variety of devices and software as possible, was key to the strong electronic diversity at Dakota.

Today at Dakota, almost any device can access almost all of the material that a teacher or student might want for school. Of course, sometimes things don't work, but those challenges are always faced with a positive attitude and good will to sort out the problems. The relationship between Dakota and the LRSD IT department is flexible, ductile and positive. Both the school and IT department cultures value IT diversity and strive to be "device agnostic"; this solution-focussed approach has been very helpful for students and teachers in class. Unfortunately, IT departments are sometimes characterized as gatekeepers and fun-killers when teachers try to innovate, improve, and include more educational technology. Nothing could be further from the truth for Dakota and the LRSD IT department. The ongoing relationship of respect, trust, and mutual accommodation has helped to make the BYOD program at Dakota a sustainable success.

The young people who attend Dakota Collegiate are, perhaps, what continues to change the most at the school. Google and Facebook are now older than students entering grade 9. All of the students, even those arriving as refugees from various parts of the world, are familiar with cell phones. The concept of storing information on a computer is usually clearer to them than storing information on paper. Using information and communication technology has always been part of their lives, in many cases beginning in their pre-school years. Given these radical changes, Dakota Collegiate has become a school where these realities of communication are accepted, and embraced for educational purposes. It is no surprise at all to the students that they are expected to type their assignments, work in groups, collaborate online, share their work with live and remote audiences, and share information online. After all, they are doing all of these things already outside of school, so why would they not do these things in school? When Dakota students compare their school experiences with others at non-BYOD schools they are often shocked to learn of cell phone bans, no wifi, and paper-based storage and retrieval of course work. Yet these things are still the norm in Manitoba schools. Students at Dakota are glad to have a school that reflects the world outside the walls of the school; ICT use is expected and valued, not forbidden and marginalized.

So, are we Improving, or are we Innovating? (and does it matter?)

Andy Hargreaves (University of Toronto, 2013) points out the differences between school improvement schemes that aim to improve existing practices and school innovation which sheds older ideas in favour of new ones. The punchline is that the most successful schools do both; they fine-tune best practices while taking up new ideas that require a shift in the way everyone thinks about school. The

BYOD program at Dakota Collegiate is certainly innovative, but it is an innovative portion of an overall school culture that recognizes incremental improvement as the most expected measure of progress.

There are still staff members at Dakota who question how much the BYOD program has improved learning at the school, and I hope that these questions will always be asked. Education is a very traditional field, and people value traditions. Exams are traditional, lectures are traditional, and well-used library cards are traditional. If schools are measured by their ability to carry on the expected traditions of education, then Dakota would do fine by those measures. However, finding ways to effectively measure the value of the BYOD program at Dakota means looking at much more than the results of pen and paper Provincial exams. The data has to include the perceptions of students, their families, and their teachers. New measures of school improvement and innovation need to focus on engagement, student interest, content knowledge and the ability to combine knowledge from content areas (Manitoba Education, 2010). New measures should also include ways to show how well or poorly people cooperate, how much they exhibit empathy, and how they interact with others locally, nationally and even globally.

Finding new ways to think about the new roles that schools play really matters. The improvements and innovations at Dakota are tangible, are real when one visits the school, talks with the people, and understands the changes that are underway. Site visits help people to understand Dakota, (Metcalfe, 2013) and it was only after a site visit by David Roberts (C21, 2015) that Dakota won the "Shifting Minds" award in 2015.

Good things are happening at Dakota Collegiate, but traditional measures of school success do not always capture the story. Measures of employee and student engagement might do a better job of mapping Dakota's success into numbers, for those looking for empirical data. The dearth of effective measurements for the success of innovative educational initiatives is captured well by Fullan & Langworthy (2014):

> Leaders who become partners in the deep learning processes, and who foster collaborative, risk-sharing cultures, invite and expand inherent change in schools and systems where the new pedagogies are taking off. But whole-system change still faces significant barriers in most places. These barriers reside primarily in the student assessment, teacher evaluation and school accountability regimes that currently define success for our education systems. Until we find new ways to define and measure success – ways that measure schools' adoption of new pedagogies and students' achievement of deep learning outcomes – crucial system factors will stand in opposition to innovation. New measures are urgently needed to give students, teachers, parents and leaders a clear picture of what deep learning really means in practice and how it can concretely and positively affect the futures of our young people.

In the future new measures will be developed by research groups and adopted by educational authorities. Meanwhile, Dakota will continue to improve and become a better, more progressive, inclusive, and innovative school even in the absence of new measures to describe these new kinds of success.

Looking Ahead: BYOD is growing and changing in the LRSD

Seven years in, Dakota's BYOD program continues to show promise. The Louis Riel School Division has watched closely as Dakota has wrestled with making it work as well as it can for all students. It is true that not all families can afford a computer, and so the school and division developed short-term and long-term loan options for families to access. Issues of equity have been addressed well enough that BYOD is being examined for implementation at other high schools in the Louis Riel School Division, which is a further sign of the success of the BYOD program.

Promises are always about future performance based on the best information possible in the present. Sometimes things do not work out as planned, but often they do, and often enough that people value the idea of a promise. The BYOD program at Dakota Collegiate continues to be an ongoing adventure, filled with challenges, and a few setbacks as well. However, most of the staff have come to appreciate the ways we get to interact with young people using current technology to try and understand a rapidly changing world. The Dakota BYOD program showed promise in 2009, has fulfilled those initial promises, and continues to transform the learning and thinking of all who are involved in the endeavour. It certainly has been, and continues to be an incredible experiment in learning that shows promise for our students, and serves as a beacon for those considering the promise and potential of BYOD education.

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Roy can be found on Twitter @Roy_Norris

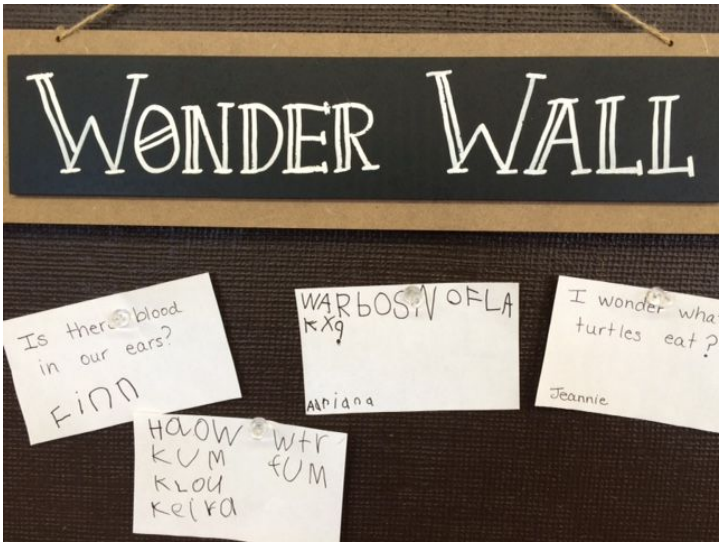
Chapter 4 - Unpacking Citizenship in a Digital Age

Tara McLauchlan and Joan Badger

As you scroll through the Instagram feed of George Waters Middle School, in the St. James-Assiniboia School Division (SJASD), it becomes very clear that the photos are more than just snapshots into the daily events at the middle years level. They tell a story of citizenship, a community of learners that believe in caring for the world and for those with whom they share it. One photo, features the smiling face of a father and his two children, recent arrivals to Canada from the Sudan. Another, shows students participating in a mystery Skype with classrooms in Iowa and Chile. In recent years, posts like this have become a common story for many schools in the SJASD. These photos reflect a school's ability to engage with not only their immediate community, but the global community that exists beyond the physical school.

There is no doubt that technology has helped to play a role in connecting our schools with a larger global context. Social media platforms such as Instagram, Facebook and Twitter shrink our vast world and relocates it to a small glowing screen. Here, walls, borders, and boundaries no longer exist. However, this access to a wider, global community is not without it's challenges.

For the teachers and students in SJASD, it means engaging in deep conversations about what it truly means to be a participant, a citizen, in today's world. This is where the global initiative, New Pedagogies for Deep Learning , began to provide a framework and continuum in which to anchor our thoughts and discussions around the six C's of collaboration, creativity, communication, character, critical thinking, and citizenship. The progressions developed by NPDL, provide a continuum describing each dimension of citizenship beginning with limited evidence through to proficiency and beyond.



For the purposes of this chapter, we will focus on our journey with New Pedagogies for Deep Learning (NDPL), through the lens of citizenship. Particularly as it connects the synthesis of citizenship to new pedagogies, learning partnerships, leveraging digital and the learning environment.

Early years learners are full of wonder, and often the simple act of going out for recess or walking through the community can inspire questions such as "where do tears come from" or "what does #shoallake40 mean?" Since delving into partnership with the New Pedagogies for Deep Learning, the teaching and learning practices at Crestview Elementary have shifted to include pedagogies that promote inquiry and support actively planning for students to acquire skills as defined on the learning progressions of the "C's". The learner's innate curiosity about the natural world,

inspired the creation of "Wonder Walls" where students are encouraged to share their questions about the world around them. With teacher guidance, students were able to focus in on questions that would connect with an authentic audience. Then, it was with ease that teachers could take the questions students had developed about the world and find connections in the curriculum to springboard new knowledge and skills into active problem solving about real-world problems and challenges. Learning has become seamless as children's questions cross disciplinary boundaries. For example the question "what does #shoallake40 mean", inspired actions such as advocating for access to clean drinking water for all peoples in Manitoba, and has students in grades 4 and 5 drawing upon their skills and knowledge in Language Arts, Science, Social Studies, Mathematics, and the Arts to improve and represent their understanding. A learning partnership with Manitoba Keewatinowi Okimakanak Grand Chief Sheila North Wilson, and Shoal Lake #40 Chief Erwin Redsky empowered students to ask "how can we help"? Chief Erwin Redsky's response was clear, "education, people need to know what is happening in Shoal Lake". Students are now invested in the learning process because they have been given a key role in directing how to share what they've learned. These pedagogical changes have fostered a culture of citizenship and collaborative learning amongst students and teachers. Most importantly, this partnership and professional learning has made possible a fundamentally different approach to teaching and learning.

Adolescents navigate their way through the "middle years", making sense of who they are and trying to find their place within the world as citizens. They thrive on learning partnerships and participating in real-world challenges. Cynthia Sinclair, a grade 7 teacher from Lincoln Middle School focused on this when planning a learning experience for her students. After learning about the Charter of Human Rights, the quality of life in developed and developing countries, and of the many injustices facing people today, Sinclair challenged her students to draw from their knowledge, creativity and empathy to positively impact the world around them. Using the NPDL Citizenship learning progression as a guide, students tackled real world problems that were open ended and unstructured, in which they themselves created a perspective or way of looking at the issue rather than have one framed for them.

Students formed their own groups based on what area (hunger, education, child labour, access to clean drinking water, etc.) they chose to pursue. Next, they created multimedia presentations to help promote their cause/fundraiser. The goal of the activity was to create an intriguing presentation that would compete with the other groups in the class in a Dragon's Den type competition. The winning campaign would then receive class support to implement the fundraising activities. Facilitated through the use of technology, new learning partnerships emerged between students, parents, local businesses and organizations such as Red Road to Healing , Education Without Borders, Osborne House/Willow Place, and Little Warriors.

On their own time, this group of three young ladies collected over 2000 items to donate to victims of domestic abuse. They also created an impressive awareness campaign, creating t-shirts and community posters. They were featured on their school blog

Sinclair notes that students developed an intrinsic motivation and stopped focusing on their "marks". While the project itself ended in early April, students continued to be involved in their fundraising and activism beyond the end of the school year. As Fullan states in A Rich Seam, "Digital access makes it possible for students to apply their solutions to real-world problems with authentic audiences well beyond the boundaries of their schools. This is the real potential of technology to affect learning – not to facilitate the delivery and consumption of knowledge, but to enable students to use their knowledge in the world." The learning partnerships created by Sinclair and her students were fundamental in developing a concept of citizenship that is about making decisions that are good for everyone, not just themselves.

Image 3 - Links to the Middle Years video reflections of students and teachers.

High Schools can be loud, bustling learning environments and it's not uncommon for some of the quieter voices to get lost in the crowd, especially if English is not their first language. One project at College Sturgeon Heights Collegiate is empowering the EAL community to help bring these global voices to the forefront. In an innovative project titled "The Most Beautiful Word", over 75 EAL and International students and staff worked together to select the most beautiful word in their first language. Using canvases and paint to create a visual representation, these 75 canvases will become the basis of an art installation in the school cafeteria.

Each canvas will also feature a QR code (E) that links to an MP3 file of each artist explaining their word in both their first language and English, and also sharing why that word is so important to them. Once installed, this art exhibit will create an environment that invites staff and students to interact with the artwork on more personal level. Scanning the QR code adds a "virtual reality" to the artwork in which the artist speaks directly to the viewer. Each accented voice of an artist will reveal a global perspective and begins to give insight into the values that we share as global citizens, as well as highlight the things that make each culture unique.

Scan this to step into the College Sturgeon Heights Collegiate "Most Beautiful Word" Art Project:

When looking through the lens of NPDL and the 6Cs, it is easy to see the educational complexity of "The Most Beautiful Word Project", with particular focus on the Character and Citizenship progressions of the NPDL. For many of the students participating in this project, writing, speaking and recording the script to explain their artwork required massive amounts of the "grit" and "tenacity" described in the Character skill of the NPDL deep learning progressions. Explaining an abstract concept, such as love, or fate, or friendship, can be a challenge to do in your first language. So imagine the perseverance needed to translate this abstract concept into another language (in this case English). Then, add to this, the vulnerability of sharing (and recording) your perspective with a voice that sounds different than the majority of the voices around you. Through their grit and tenacity, these EAL and international students are empowered to share their global perspectives and cultivate a school wide discussion that explores the concept of citizenship. This clearly connects to the Citizenship progression of NPDL as learners are "developing a sense of their individual cultural identities" while also creating a learning environment that encourages their school community to develop an "open minded curiosity about different cultures and worldviews." (NPDL Progressions)

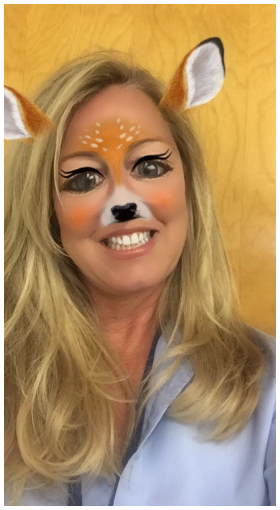
From early years to senior years, citizenship is a common thread throughout our curricular documents. The NPDL progressions provide discussion points around the growth and development of our learners as citizens. Furthermore, and perhaps more importantly, the NPDL inspires action, not just discussion. The fusion of the citizenship progression with pedagogy, learning partnerships, leveraging digital and the learning environment encourages our learners to look outwards and to "think like global citizens, considering global issues based on a deep understanding of diverse values and worldviews, and with a genuine interest and ability to solve ambiguous and complex real-world problems that impact human and environmental sustainability." (Australian Visual of NPDL)

Three truths and a lie about Tara:

1) As a child, Tara appeared on Sesame Street.
2) The first book Tara bought and paid for on her own was from a Scholastic book order and it was Laura Ingalls Wilder's "Little House on the Prairie".
3) A true nerd, Tara has a "Live Long and Prosper" tattoo.
4) Tara signed up for Snapchat just to create the photo for this bio.

Find Tara in the digital realm-

Instagram: @msmclauchlan Twitter: @msmclauchlan



Three truths and a lie about Joan:

1. Joan has taught at Ryerson
2. Joan stages homes as a side job
3. Joan played Liesl in The Sound of Music
4. Joan hates shopping

Find Joan in the digital realm -
Instagram: @jbadger5
Twitter: @jbadger

Chapter 5 - Connecting Classroom Learners: SJR GAfE / G Suite for Education

Phil Taylor

My Beginnings:

Little did I know how much Google Docs would change the way I interact with the computer and my students. My first experience with a collaborative Google doc was during a ManACE planning session led by the President at the time, Roland Buduhan, now the Principal of Junior School at St. John's-Ravenscourt School. He wanted to show the Board of Directors how this new tool may work for creating collaborative agendas. This was an interesting experiment in the fall of 2007, because you couldn't see what was happening on the screen live. You would have to hit the browser's refresh button every now and then to see what was typed by others. You can imagine how confusing this process was. For those of you interested in the history of Google docs, please explore this link Today's Scuttlebot: The Origin of Google Docs, and Spying on Your ...

A number of years ago at SJR, we were looking for an alternate method of dealing with student email. Our in-house system was becoming unreliable and attaching files for example, was a real challenge. The ICT Advisory Committee heard about a new education edition of Gmail specifically created for schools, and I recalled the ManACE experience with Google Docs. The new system was called *Google Apps for Education (GAfE)*. Google Apps for Education has an entirely different set of rules and regulations and privacy settings and we thought, let's give this a try for student email. Google Apps for Education was renamed *G Suite for Education* recently and more improvements to the suite are being implemented to take advantage of Google's work in artificial intelligence:

> G Suite for Education is the same set of apps that you know and love—Gmail, Docs, Drive, Calendar, Hangouts, and more— but designed with new intelligent features that make work easier and bring teachers and students together. Because we believe that when students and teachers break down silos and have collaborative tools for their classroom, amazing learning can happen.

The email program was a huge success at our school, as we were able to get away with file upload barriers and we were able to take advantage of a cloud computing device independent platform. It was then decided by the ICT Advisory Group that we might want to explore the Google Docs tool. At that time, Google Docs referred to the Word Processor, Spreadsheets, and Presentation tools. We started up a beta test program in the fall of 2009 with three teachers and three classes to explore the possibilities of this new collaborative tool. It quickly became evident that there were many benefits to using Google Docs, the word processing tool. We eventually decided on calling our GAfE domain, SJR Learners.

I am still getting used to the new name of the suite, so I will continue to use the former *Google Apps for Education* name in this document. GAfE has become a foundation piece for our school's 1-to-1 program. This cloud based suite was the first available solution that was platform-independent. SJR's 1-to-1 program, spanning grades 5 to 12, is based on a BYOD model. Our needs included a tool that

works well with the Apple OS, and the various incarnations of Windows laptops. In addition, the School provides Chromebooks for our Grade 4 students 1-to-1 needs.

Have the tools found in Google Apps for Education and cloud-based productivity tools worked?

We have found over the past four years the exchange of documents between students and faculty has been greatly enhanced. When I think back five years ago, the issues we faced were with students having different versions of *Word* than we had access to as faculty members, or with students using *Pages* on the Mac platform which we did not have. The challenges of management of document flow was significant and impeded the easy exchange of documents.

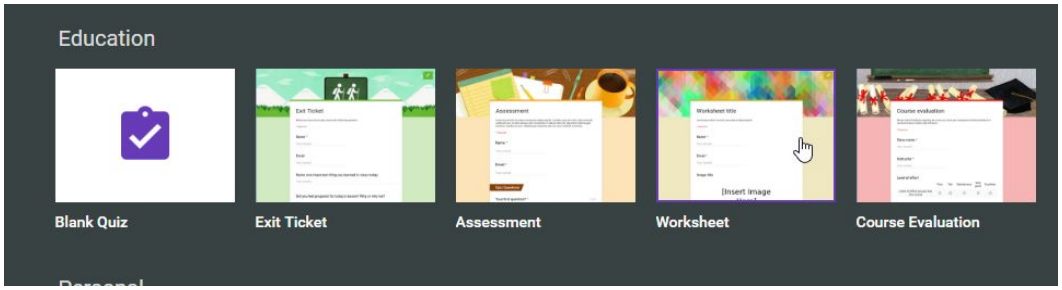
At the Faculty level, we also had issues with submission of student work, emails being sent to incorrect addresses, misplaced or misfiled by the sender and or receiver. I'm sure you've experienced this too. How have GAfE tools changed all of this? Because there is unlimited storage within our SJR Learners - GAfE system, deleting files is no longer necessary, and because GAfE is powered by Google, searching for files finds everything, especially when you use search filters. The search feature even looks within the contents of Google Doc files.

As an ICT teacher with a computer lab, I've been experiencing 1-to-1 computer use for many years, at least while the students are in my lab. As with any initiative, there are growing pains. Controlling document flow and the sharing process of files and emails was becoming an issue for me, and other early adopters of the Google Apps for Education tools as the number of documents grew. Students would forget to share files, or share to the wrong email account. Different management ideas were tested to smooth out the ability to share documents. Sharing Documents is an essential step to utilize the collaboration and feedback features found in Google Apps. Document management was greatly improved with the release of *Google Classroom*. Google Classroom use is the fastest adopted educational technology tool that I've experienced in my many years of using educational technology platforms.

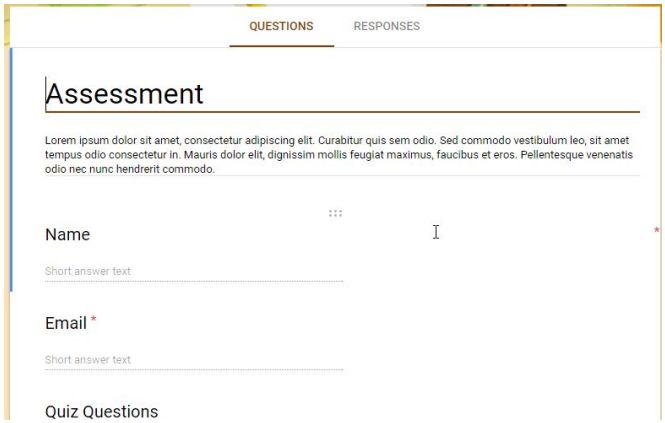
How has your thinking about assessment changed?

For the past few years I have been exploring different types of assessment practices and reflecting on how I can provide feedback to my students in a timely and efficient manner. I'm in the process of reading *Embedding Formative Assessment: Practical techniques for K - 12 Classrooms*, by Dylan William and Siobhan Leahy. I see a lot of possibilities for using Google Forms and other tools within Google Apps for Education to help with assessment, especially the collection of learning evidence. The collection of information for further analysis is quick and efficient using the digital tools found in Google Apps. I appreciate the ability to go back and analyze information to help tailor the instruction and learning opportunities that occur in my classroom.

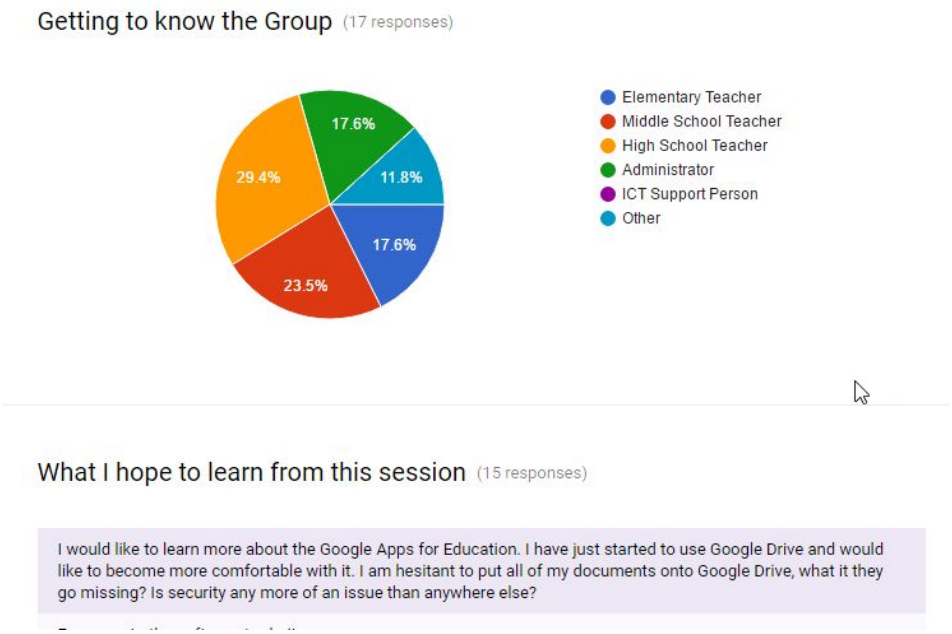
Google Forms is a great way of checking for understanding with my students and collecting evidence of their thinking. My Grade 9 Students love comparing their results with my six year survey on Technology Use by Students. There are a variety of features added on a regular basis within Google Apps for Education. The newer template files feature found in the Forms App, for example, allows you to quickly create documents such as “exit slips”. Forms can be reused for long term data collection or copied in order to create new snapshots of learning.



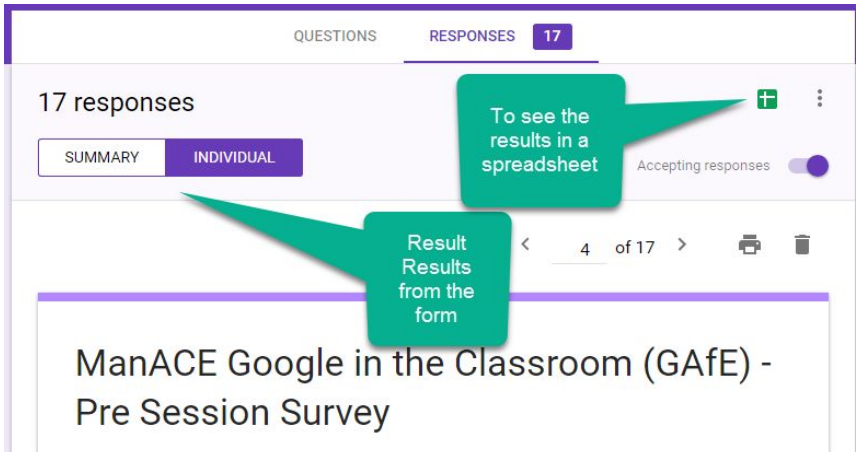
Below you will see a screenshot of an assessment form created from the template gallery. All the user has to do is go in and modify the questions for the particular assignment. The results are then stored within the form and you have the option of sending the results also into a spreadsheet which you can review. The summary chart automatically created via the Summary feature provides a quick method for analysis of students' responses.



In my experience, I have found that certain types of rating scales or multiple choice/checkbox questions lead to better charts. For quick informal surveys, these charts are invaluable. You can quickly see if the students "got it". I also like to use Forms to assess prior knowledge. In the following screenshots you will see a partial survey chart in which I was checking for prior knowledge and getting to know my "*students*" prior to my ManACE SAGE session. I was quickly able to see who my audience was going to be. For more open-ended questions, the use of a paragraph style input box collects more data that you can peruse at your leisure.



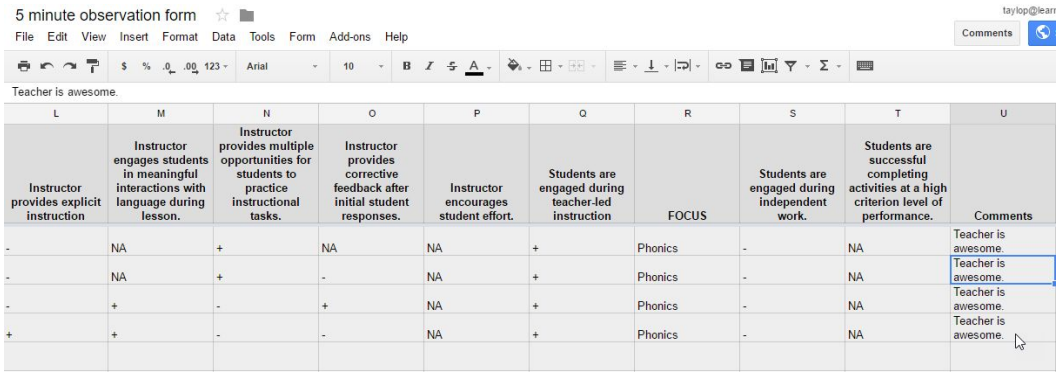
Last year, Google updated Forms, so you can now see either group summary responses, or you can switch to individual mode to review the data in that format. I still tend to go to the spreadsheet view to look at data when I want to explore and examine specifics. This information can also be charted and used in presentations to groups or for data analysis summaries.



The possibilities for using this one tool are endless. If you do a quick web search, you will find there are a lot of people willing to share resources. Someone that I discovered via Twitter is Alice Keeler (@alicekeeler). Her websites provide a wealth of information and how-to tips.

Below is an example of a simple spreadsheet view of survey results Alice Keeler created. Forms deposit the survey results into spreadsheets and also provide quick visual summaries. In the example below, you will see a sample *Form* designed for a school administrator for doing a quick walk-through of a classroom. The screenshot that follows shows how the data is interpreted in a chart. There were no extra

steps on the teacher's part to create charts. This summary information is found under the *Form Menu* when you use a spreadsheet to capture the results of a survey.



5 minute observation form

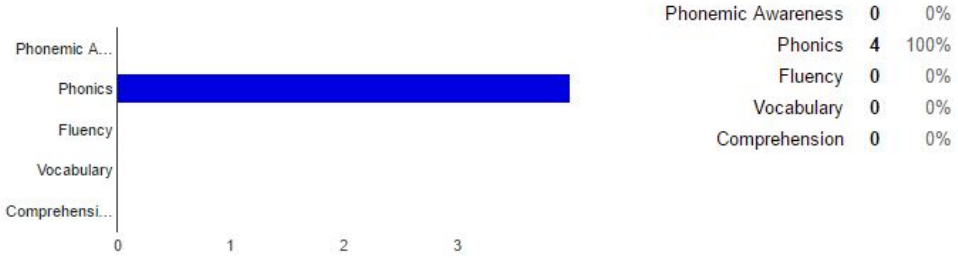
File Edit View Insert Format Data Tools Form Add-ons Help

Comments

Teacher is awesome.

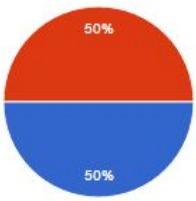
L	M	N	O	P	Q	R	S	T	U
Instructor provides explicit instruction	Instructor engages students in meaningful interactions with language during lesson.	Instructor provides multiple opportunities for students to practice instructional tasks.	Instructor provides corrective feedback after initial student responses.	Instructor encourages student effort.	Students are engaged during teacher-led instruction	FOCUS	Students are engaged during independent work.	Students are successful completing activities at a high criterion level of performance.	Comments
-	NA	+	NA	NA	+	Phonics	-	NA	Teacher is awesome.
-	NA	+	-	NA	+	Phonics	-	NA	Teacher is awesome.
-	+	-	+	NA	+	Phonics	-	NA	Teacher is awesome.
+	+	-	-	NA	+	Phonics	-	NA	Teacher is awesome.

Data from the Form above.



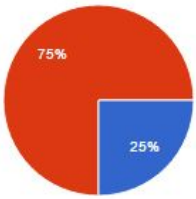
Phonemic Awareness	0	0%
Phonics	4	100%
Fluency	0	0%
Vocabulary	0	0%
Comprehension	0	0%

Instructor models Instructional tasks when appropriate



+	2	40%
-	2	40%
NA	0	0%

Instructor provides explicit instruction



+	1	20%
-	3	60%
NA	0	0%

If you have been reading the works of authors and educators such as George Couros, you will have been reading about making student learning visible. I have found that the use of online tools and discussion forums gives voice to all, including the more introverted student. Over the years I have found these tools provide an opportunity for students to think and reflect and to show their learning.

Google Apps for Education tools have provided me with a large variety of methods of "checking for understanding". I do not have to guess if my students are having issues or understanding activities in my classroom. The digital gathering of information and virtual conversations with my students helps build

the face-to-face relationships. Our Advisory program in the Senior School at SJR is multi-grade. The younger Grade 9 students at first may not be as willing to share in a public fashion. They gain confidence in sharing their ideas using this digital format. Google forms as mentioned already, provides a quick way of gathering snapshots of information for further conversations.

A growing number of Faculty use Google Docs to have students reflect on their learning. This usage has increased dramatically in the past few years as the 1-to-1 program has expanded. My ICT 9 course for example, has a year-long project of their choosing based on Google's *20% Time* Project. Some folks also call this *Genius Hour*, or *Passion Projects*. One of the components of assessment for the 20% Time student selected project is the use of a shared Google Doc in which students outline what they've done as part of the planning process. For collaborative projects, Docs provide a common space for peers who are working on the project. The revision history feature in Google Docs provides me with evidence of individual group member contributions.

The 20% Time Project Google Doc becomes a powerful piece of evidence of the project process and progress as the year unfolds; there is ample evidence of learning. I use a comment feature within Google apps, to provide feedback, ask questions, and or seek clarification. My students then have the ability to communicate with me via this medium in an asynchronous fashion. I found this a very effective way of interacting with my students, especially the quiet ones.

Has 'time' changed in your classroom?

There have been many discussions about the benefits of Blended Learning environments in recent years. In my experience, I have used a variety of tools to create an online presence that my students could access 24/7. In the early days I created course websites, very much Web 1.0 "sit and get". There were a lot of information resources for my students to explore and have access to in these sites - a digital textbook so to speak. I still provide these resources, but I wanted to take advantage of Web 2.0 tools so that a student interact with me, classmates and at times others, outside of the classroom. I turned to Google Apps for Education to make learning more interactive.

As some of you may be aware via Twitter, I am a huge fan of *Moodle*, a Learning Management System. I still maintain Moodle sites for all of my course work, but I found that I am increasingly moving towards Google Apps tools for the day-to-day interactions with my students. The ease of use of Google Apps for Education tools is part of the reason for that change. Our School's 1-to-1 laptop program is another reason. Now that students have access to technology at any time, any place, the Google Apps for Education platform has grown in importance as an easy to use collaborative suite of productivity tools, both for Faculty and students.

Google Classroom has become a very powerful tool at my school. As others have noted in comments in the Twitter #GAFE hashtag, Google Classroom is becoming the anchor for our digital learning spaces. Teachers who have been reticent to, or unable to find the time to learn the intricacies of tools such as Moodle, or creating class websites with Dreamweaver, have appreciated the simplicity and power of Classroom. This is especially true in humanities courses.

I use Google Classroom as a workflow tool. I can quickly and easily create assignments, differentiate tasks, and interact with my students via Classroom. One of the early problems we faced with Google Apps I mentioned earlier was document management. Students would forget to share the document and the shared document was a challenge to find by the teacher. This made the process of

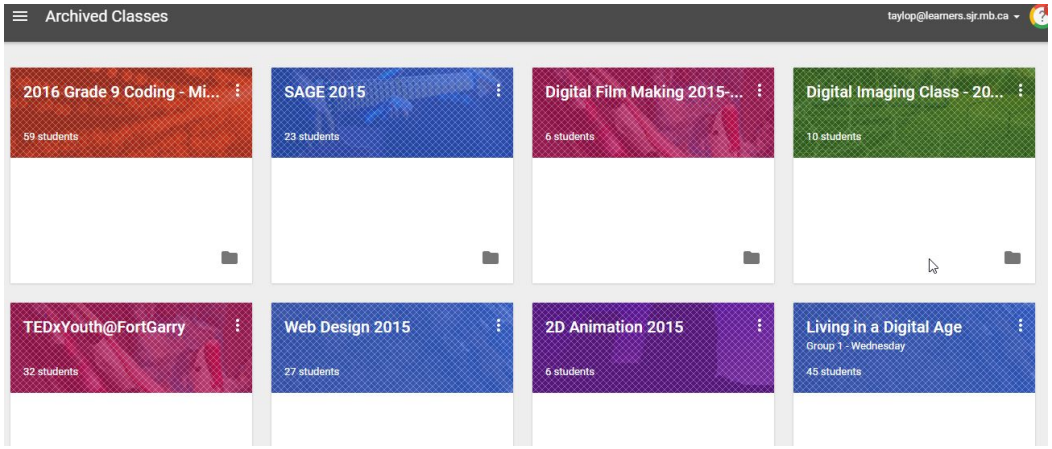
adopting the digital tool both challenging and frustrating to Faculty and students alike, as the volume of files increased.

Google Classroom has simplified all of that. Student work is organized for you and your students in the Classroom environment. If your school doesn't have Google Apps for Education, you may not have access to see how Google Classroom works. The simplicity of Google Classroom is part of the reason for its success and rapid adoption around the world.

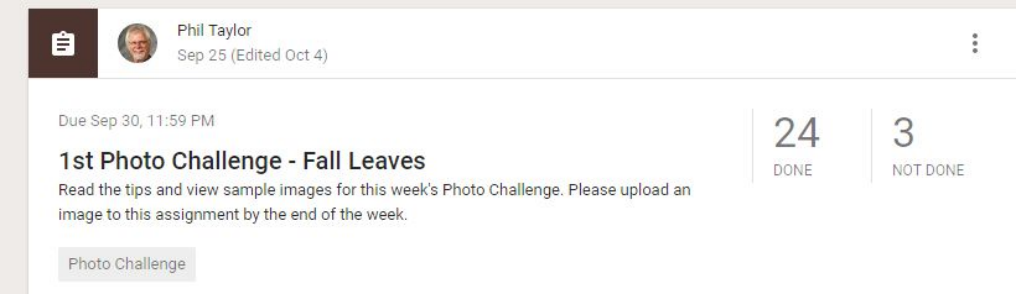
There are three main components to Google Classroom. The primary area is known as the *Stream*. This section of Google Classroom looks and works very much like many social media sites with the most recent information at the top. This stream provides a simple method in which one can use a large number of digital tools available to share information, distribute resources, and provide feedback to students. It is so easy to use and effective we use Google Classroom as a communication tool between Principals and Faculty. A number of co-curricular clubs also use Google Classroom as a way of communicating and sharing information with members.

The other two components are *Classmates* and *About*. In these two areas you will find the members of the classroom and the reason for which the classroom exists. The Classmates page allows teacher to easily find a student or group of students to email. If the new *Guardian* Feature is enabled, parents are invited to sign up for summary of activities. It they accept the invitation they will also be listed on the Classmates page and seen by the teacher. Access to a Group Calendar and Google Classroom file folder is located on the *About* page.

Below is a screenshot of some of my archived classes. You will notice that some are for classroom learning spaces; others are for clubs, special school activities, and professional development areas. A great time saver now that I am in year three of using Classroom is the ability to reuse a post from another Classroom. Individualized template documents that were successful are quickly recreated for reuse and modification as required. If you teach multiple sections of a course, you have the ability of creating multiple instances of the assignments and posts.



Google Classroom can be used for collecting various digital documents and files. As you see in the image below, I need to have a conversation with three students about why they did not submit their sample image yet.



Prior to Google Classroom, I had to locate these images on the student's network drive. Now I have a virtual space to collect work and provide feedback via the comment feature built into the system. A recent update in the mobile and tablet app versions of Google Classroom, is the ability to use "digital ink" to provide feedback to my students. A digitally inked PDF version of the document is stored along with the original file.

Has collaboration been altered?

Collaboration had changed significantly using the various tools found in Google Apps for Education suite. As I mentioned at the beginning of this piece, my first experience with Google Docs was an attempt to create collaborative agendas and minutes. In 2011 I read the book *Literacy is Not Enough - 21st Century Fluencies for the Digital Age*. Aside from being a great read, the authors of the book constructed the early drafts of their project via Google Docs.The authors were located in various parts of the world and for one of the earlier projects had not actually met each other face to face. Pause for a moment and think. This would not have been impossible without great expense a few short years ago.

As I explained earlier, Google Docs and Google Classroom have become an integral part of the 20% Time Project I use with my students. Another example at our school is a popular Grade 10 Geography video project. GAfE provides education unlimited storage in the cloud. This is very useful for these collaborative Geography projects. Students use Google Docs for project planning and script writing. Given the unlimited storage benefit, students can upload their rendered video into a shared folder for presentation time. Behind the scenes, Google uses its YouTube technology to convert the rendered video from any output formats into a player that looks remarkably like YouTube. With the sharing permissions options available in Google Drive folders, the class can decide who has access to the completed work.

Are any 'new voices' heard in your classroom?

I am finding one of the greatest benefits is the student voice provided to those introverted, quiet, shy, students. Using the comment feature in Google Docs, an asynchronous conversation can occur between me, my students, and and their peers. Within Google Classroom I can also leave private comments, providing feedback and digital communication with my students. Recently Google Classroom introduced a Discussion feature. These tools provide a way for the quiet reflective student to have time to think about their response, and in many cases, they are then able to provide insightful thoughts and ideas that would have otherwise been lost to class. Additionally, these tools help me as a teacher better understand the thinking and thought process of my students. My *Digital Picture* course, for example, relies heavily on Google Classroom for class projects. Students can upload not only traditional word processing documents, but their images, and also participate in threaded discussion groups.

Ideas for Infusing Technology into Manitoba Curricula

This past summer, new Google Sites was introduced. My school was accepted into the early adopter program. This gives us a year in which we will be able to use both the traditional Google Sites tool, and the new Google Sites. For those of you familiar with the first version of Google Sites, a significant refresh was due. The new version of Google Sites works like some other web-based creation tools such as Weebly. You are now able to drag in different components to construct the site layout. Of course, all of the student's GAfE projects are a click away.

Referring back to my *Digital Imaging* course, I am currently having my students create a portfolio to show examples of their learning. In my class of 27 students, each of them created the first foundations of a site in under five minutes. The students found the process quite intuitive overall. One of the nicest features of the new version is the website is automatically optimized for viewing on a laptop, tablet, and smartphone. Another improvement is the similar live editing in a Google Doc; several editors can work on a site at the same time, each seeing what the other is doing live when they are working on the same page. That is a lesson in collaboration and cooperation! It is a challenge to make an ugly sight with this new tool. Think of the possibilities: student projects, class websites, and a flexible tool to collect examples of student learning.

Google Apps for Education, now known as *G Suite for Education*, is always updating and modifying the tools and resources that are at our disposal. A few years ago when preparing part of a PD Day session, Google Forms had a major look and feature update the night prior to my *SAGE Day* activities. While caught unaware, I was able to demonstrate that learning never stops, and that the new features far outweigh our tendency to be wary of change. I now know where to check for feature updates. Most of the time these changes in the various *G Suite for Education* tools are more incremental.

With the new name for Google Education tools, *G Suite for Education* comes with a promise from Google to add more artificial intelligence features to the various tools at our disposal, to enhance the process of content creation, collaboration, and sharing of learning. *G Suite for Education* is a powerful set of collaborative productivity tools for you and your students to explore.

My Continued Journey with Google Education Tools

So taken with the power of GAfE, I felt compelled to do some GAfE training. I recently completed the third iteration of Google Education Training and Exams. At this point, I am a Google Certified Educator Level 1 and Level 2. I recently completed the Trainer Course and GFE Trainer Skills Assessment in preparation to becoming a Google Certified Trainer. I am most impressed with the focus on pedagogy in the latest iteration of training resources provided by Google.

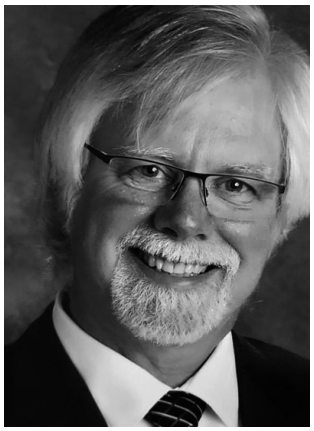
If you are an educator who would like to expand your digital tool set, I encourage you to consider working through the Fundamentals Training as part of your professional growth plan.

> …. reading, watching videos, and doing activities, you'll learn how to integrate Google in your classroom. You can start and stop lessons at any time; we'll track your progress through the course. At the end of this course, you'll be ready to take the exam to become a Google Certified Educator Level 1.

The major topics of learning include:

- *Engage in Professional Growth and Leadership*
  - Get Ready to Use Technology in the Classroom
  - Expand Your Access to Help and Learning
- *Increase Efficiency and Save Time*
  - Have a (Mostly) Paperless Classroom
  - Save Time Communicating
  - Organize Activities for Yourself and Others
  - Bring Meetings Online
  - Bring Student Work Online
  - Measure, Understand, and Share Student Growth
- *Facilitate and Inspire Student Learning and Creativity*
  - Teach Students Online Skills
  - Build Interactive Lessons
  - Captivate Your Class with Video
  - Facilitate Group Work
  - Promote Digital Citizenship and Positive Online Behavior

This free set of resources will give you many ideas of how you can use educational technology tools in your classroom. Many of the concepts are transferable to other EdTech tools. Taking the exam is not necessary, your learning will be valuable in itself.



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St. John's-Ravenscourt School
Certified Google Educator

Part 2 - Connecting and Sharing

Chapter 6 - The Connected Classroom

Devon Caldwell, Oak Lake Community School, Kindergarten Teacher
Leah Obach, Hamiota Elementary School, Grade 1 Teacher

Leah started working with Devon during her second student teaching placement while she was a pre-service teacher attending Brandon University. The two educators quickly developed strong synergy and shared a similar vision for education. Since Devon and Leah worked so well together, they agreed to find ways to continue teaching together even when Leah accepted a position in a different school division. Ever since, the two educators have partnered on a variety of projects and initiatives. Not only do they love working together, but these two educators also have found meaningful ways to connect their classrooms to foster collaborative learning. What began as a digital team teaching approach has developed into an ongoing, collaborative project-based learning model.

Each year, the two teachers introduce their students to each other and explain that they will be working together throughout the year. In the first months of school, they establish one community of learners between the two geographically separate classrooms. Leah and Devon typically introduce the students via Skype video conference so that they can see each other and have a conversation. Subsequent interactions can be through social media, additional video calls or email. Devon and Leah strongly believe that working in a connected classroom enhances teaching and learning by sharing with a real-world audience, fostering collaboration and improving communication. The most important goals of this collaboration are to empower young learners to make a difference in their world as they engage in largely student-directed, interdisciplinary learning. All classroom collaboration is purposeful, but the intention and duration of each connection varies. Some connected classroom activities are one-time events, but others develop over time. Often, students in Devon's and Leah's classes will collaborate in the context of project based learning.

Why connect classrooms?

"If you want to go quickly, go alone. If you want to go far, go together." - African proverb

Devon and Leah both believe that there is much to be gained by connecting classrooms—for students, teachers, schools, and communities. Several years of experience in implementing their connected classroom philosophy has provided ample evidence of the many benefits of connected learning.

Shared Responsibility: the connected classroom is interdependent; everyone has a role to play in order for learning to take place. As learners work collaboratively with each other and their partners, a variety of differentiated learning tasks emerge that must be completed for the project to be successful. This builds accountability among learners, their teachers, and their partners.

Authentic and Purposeful Learning: students identify what they need to learn to successfully complete a task, supported by their teacher who provides relevant mini-lessons and learning experiences. The work of the students in a connected environment is an authentic situation that mirrors real life.

Real World Impact and Audience: connected students learn in the real world, as they identify issues and problems around them (locally and globally). Learners interact with a variety of real audiences as they develop skills, access information, and implement action plans and projects.

Knowledge Construction and Curricular Outcomes: many outcomes are uncovered through connecting students in learning projects. Learners use a variety of tools and sources to access information, actively constructing knowledge that is critical to the success of the project. Some projects involve more knowledge construction than others which provides many opportunities for thinking critically about the new information they are discovering.

Rich, Deep Learning: connected kids are passionate and focused about topics that matter to them. As a result, they delve deeply into their learning. Learners often take a project or learning experience further than ever believed possible, making the direction of the project almost impossible to predict in advance.

Whom can we connect with?

Often, we think of connecting with other classrooms when we think of student and teacher collaboration. However, a range of other connections are possible. Experts such as scientists, computer programmers, or authors are often available through technology. Various partners such as environmental and animal welfare organizations, social justice groups, athletes, and authors become more easily accessible. Technology can also help strengthen connections with families and communities by using the tools that are already popular to enhance communication.

What does the connected classroom look like?

There is no prototype for the physical environment of the connected classroom but commonalities exist from one to another that foster this learning approach.

- flexible spaces for learning
- student access to materials, tools, and devices
- the belief that this is "our" learning space that we share and maintain together
- the understanding that all ideas are valued and accepted
- an environment of acceptance, choice, and voice while adhering to basic beliefs governing how we treat each other
- balance of student and teacher-led activities and decisions: teachers make choices about what are appropriate decisions for children to make

Connected Classrooms in Action

Rich, interdisciplinary learning takes place in a connected classroom and the variety of projects is often astounding. These are real examples from Devon's and Leah's early years classrooms which illustrate the power of connected learning.

Marvelous Muffins

Blog posts:
http://mrsobachsclass.blogspot.ca/search?q=marvelous+muffins&max-results=20&by-date=true

This connected classroom project developed as a result of a connection between Leah's class and an African educator. Through the British Council, these Canadian and African educators formed an initial bond. The African teacher, Mr. Eric, shared videos of his class reciting poetry in their classroom in Ghana, Africa. Leah's class watched the videos and learned the same poems, then sent back work samples from their classroom. Leah's class also started sending Tweets to Mr. Eric. One day, a student in Leah's class asked if the African classroom had computers, so they sent a message to Mr. Eric to ask. The students learned that the school did not have computers and that Mr. Eric could only email and Tweet them from his home.

Another connection was important in the development of the Marvelous Muffins project. When Leah visited Mrs. Julie Hembree's class while in Redmond, WA for an education event, Julie's class had just finished raising money to buy postage to send books to classrooms in Africa. Leah had shared this project with her Grade 1s and her students thought they might be able to help kids in Africa too, so they decided to ask Mr. Eric if his class could use books or school supplies. Leah's class learned that books and school supplies would be much appreciated by Mr. Eric's class and from there, a connected classrooms project began.

Earlier in the school year, Leah's students had brought up the idea of having a bake sale. This idea came up again when discussing how the class could raise money to purchase school supplies for Mr. Eric's class. After some discussion, negotiation and class voting, students decided to have a muffin sale to raise money for the supplies that they would like to purchase for their partner classroom. Further discussion, brainstorming and voting led to the project name - Marvelous Muffins!

Mr. Eric sent Leah's class photos of his school and classroom so that students could see the classroom space and learning materials available. The students noticed some similarities such as the alphabet on the wall and classroom furniture. One big difference the students noticed was the absence of items such as markers, crayons, whiteboards, blocks, dice, cards and manipulatives that are so common in Canadian classrooms. Instead, the African classroom had only a few workbooks, slates and chalk. To ensure that the supplies would be appropriate, Leah asked Mr. Eric what learning materials would be most useful.

Once the class decided that they'd like to help their African partner classroom by raising money to send them school supplies, they created an action plan for the Marvelous Muffins project. Students brought forth a number of important questions.

Should we sell muffins individually at the school or take orders for muffins to be picked up by families? Leah explained to her students that a class of previous students had organized a hugely successful cookie sale when they wanted to symbolically adopt polar bears. After much discussion, the class agreed to move forward with the plan to take orders for muffins, with the possibility of setting up a muffin stand for individual sales at a later date.

What kinds of muffins should we offer for sale? The class brainstormed a big list of different kinds of muffins. Students decided that they should ask others about their favourite kinds of muffins to determine what would be best to offer for sale. They were eager to ask others' opinions, so Leah

introduced the concept of a survey. This lead to the creation of an online survey that the class shared using social media and the classroom blog.

How much should we charge for the muffins? Students were discussing how much to charge for muffins, so Leah suggested they call the local bakery to find out what the bakery charged for six muffins. The class placed the call together so everyone could be part of the conversation. A student helper was able to ask the bakery employee about their pricing. They found out the local bakery charges $4 for 6 muffins. The class used this information to develop a survey question about how much people would be willing to pay for their muffins.

After determining which kinds of muffins they were going to sell based on survey results, Leah's class started to read muffin recipes. They were able to explore procedural writing, compare recipe size, compare ingredients and discuss the measurement involved in recipes.

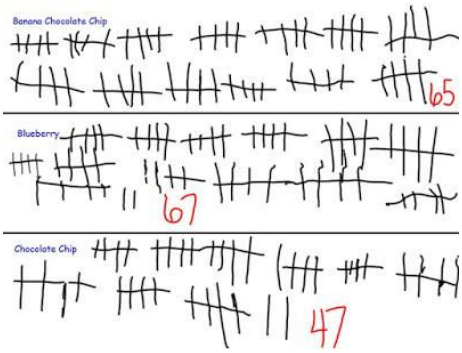
Once the class had selected their recipes, their next task was to write a list of ingredients that they would need. Using their interactive whiteboard, the class read through the recipes together and students took turn adding to the ingredient list. Next, the class went through the ingredients they already had at school and narrowed down the list to create a list of groceries they needed to buy. Leah's class took a walking field trip to the local grocery store to purchase the required groceries. Students worked together to push the cart, keep track of items on the grocery list, load groceries, unload groceries and carry groceries.

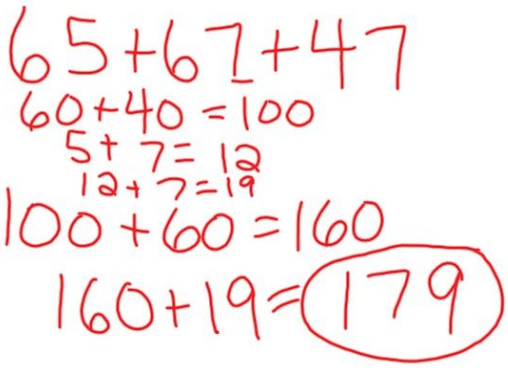
One of the steps in the Marvelous Muffins project was to create order forms. Once the class decided on kinds of muffins and prices, they developed their order forms through shared writing. In this case, students suggested information to include on the forms and Leah typed. Since their writing was projected on the interactive whiteboard, students also proofread and suggested revisions as they created the order forms. When the order forms were ready and printed, students counted out enough for each grade and sent forms home to each family in our school.

The grade 1 class was very excited to see muffin orders coming in right away! To keep track of the number of orders, they worked together as a class. Students took turns reading aloud order forms and

tallying the orders on a class chart. After they tallied new orders, they counted by 5s and 10s to find out the number of orders for each kind of muffin. As more orders came in, they added to the chart and updated the totals. It was great reading and math practice. When all orders were collected and the Leah's class finished tallying and counting all orders.

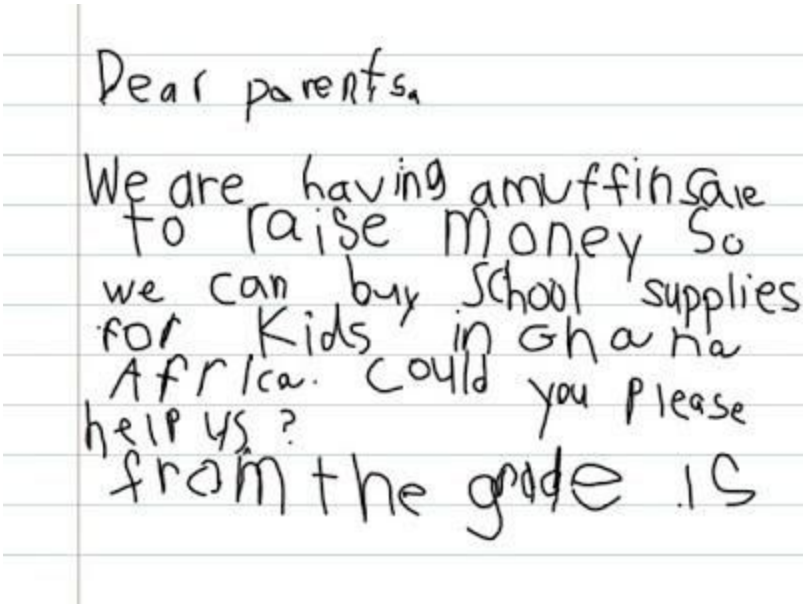
Next, students wanted to calculate the total number of orders. The numbers were quite large for grade 1 mathematicians, but the students were eager to tackle this authentic math task. Using mental math, they were able to work through a few steps to finding the total number of orders. One student suggested starting with 60+40=100 and from they continued adding up their orders. The school community showed tremendous support, with 179 orders being placed! That meant that the grade 1 class had 1074 muffins to bake.





Leah's class knew they would need help with their baking, so early in the project, they had wrote a note to their parents requesting baking volunteers. Leah's school is equipped with a kitchen, so students created a baking schedule for the days the kitchen would be available for their "bakery". As volunteers came forth, the class scheduled students and volunteers to "work a shift" in the bakery. This system worked well because Leah could continue teaching lessons in the classroom while students went to the kitchen in pairs and small groups with a volunteer. A few students got to bake each day, so everyone got a turn to bake during the course of the project.

In addition to the contribution that students made to helping others with their baking, there was also lots of learning involved. Students were able to work with volunteers to follow directions, read recipes, measure, count out orders and more. It was a **very** big job to bake over one thousand muffins, but this group of students and volunteers tackled the task successfully.


Dear parents,

We are having a muffin sale to raise money so we can buy school supplies for Kids in Ghana Africa. Could you please help us?

from the grade 1s

During the course of the school year, Leah's class had been connecting regularly with Devon's class to learn and share. Often Leah's students would share an update from their Marvelous Muffins project and Devon's students would share updates from their learning. During one of their video calls, a little girl in Leah's grade 1 asked if perhaps Devon's class could come to Hamiota Elementary to help bake muffins for the project. It turned out that a field trip was feasible for Devon's class and they were able to work with Leah's class in-person for a day, taking part in a variety of reading and numeracy activities, as well as baking muffins for the sale.

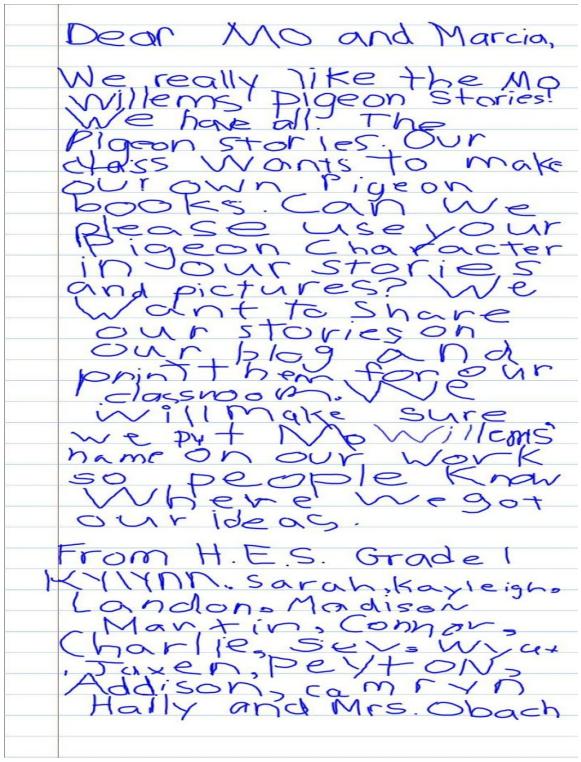
Once all of the muffins were baked and delivered, the grade 1 students used base ten blocks to calculate their profits. First they counted out the number of dollars they collected from muffin orders. Then, they "traded" some blocks so they could subtract the number of dollars we spent on groceries. Next, students counted up the remaining blocks to find out how much money they raised. The grade 1 class was excited to celebrate that they **raised $494** to purchase school supplies for Mr. Eric's class in Ghana, Africa! The class was able to purchase a variety of useful supplies and ship them to Mr. Eric

along with notes for the students in his class. Final steps of the project included writing thank you notes to volunteers and creating a video documenting the project.

Pigeon Project: http://mrsobachsclass.blogspot.ca/search?q=pigeon

When studying persuasive writing in grade 1, Leah's whole class fell in love with the Mo Willems Pigeon books. Leah used this collection of books to launch her text-type study, but these hilarious books soon became the inspiration for a connected classroom project. The grade 1 students really enjoyed reading and re-reading the Pigeon books. They enthusiastically took part in shared readings, read the books to classmates and read the books independently. Many students started drawing and writing about the Pigeon during their Daily 5 independent writing time.

Then, Leah's class had the great idea to write and publish their own Pigeon stories. Students eagerly started writing stories, but Leah soon realized that her students couldn't publish (and "steal") Mo Willems' character due to copyright rules. Leah explained this to her students and the class discussed some options for moving forward. Mo Willems' website directed them to ask his publishing company about copyright, so the class decided to ask the publisher if they could use Mo's pigeon character. So, the grade 1 class wrote a letter and emailed it off to Wernick & Pratt, Mo Willems' publisher. As shown below in the picture, this was an excellent opportunity to engage in shared writing, exposing learners to a different genre. As the teacher, Leah was able to teach and model composition, letter formation and proofreading.


Dear Mo and Marcia,

We really like the Mo Willems Pigeon stories! We have all the Pigeon stories. Our class wants to make our own Pigeon books. Can we please use your Pigeon character in our stories and pictures? We wdnt to share our stories on our blog and print them for our classroom. We will make sure we put Mo Willems name on our work so people know where we got our ideas.

From H.E.S. Grade 1
KYLYNN, Sarah, Kayleigh, Landon, Madison, Martin, Connor, Charlie, Sky, Wyatt, Jaxen, PEYTON, Addison, camryn, Hally and Mrs. Obach

Leah's class didn't hear back from Wernick & Pratt right away, so they decided to write another book with their own ideas and own characters while they waited. The students came up with a fun story called "The Counting Zoo", which was published online and in print! They even printed copies for their

classroom and took turns taking them home to their families. Eventually, Leah's class did receive permission from the publisher and proceeded with the students' original plan to publish their pigeon books. Thankfully, Leah was looping up to grade 2 with her students, so they were able to continue this project in the following school year.

Students did not follow identical steps in their publishing journeys, but instead worked on their own timelines to write, revise, edit, illustrate and publish their work. Often, students wrote their first copy in their writing journals with some illustrations. For most learners, the next step was to edit and revise their writing with teacher support. Then, students completed illustrations for the books and photographed them. The illustration photos were uploaded to mixbook.com where students put together their books. The class had generated criteria for the books and, when each student was ready, he or she shared their book with the class and, as a class, they determined if the book met the criteria or needed further revisions. When each book met all criteria, it was published online and shared through our class blog and social media.

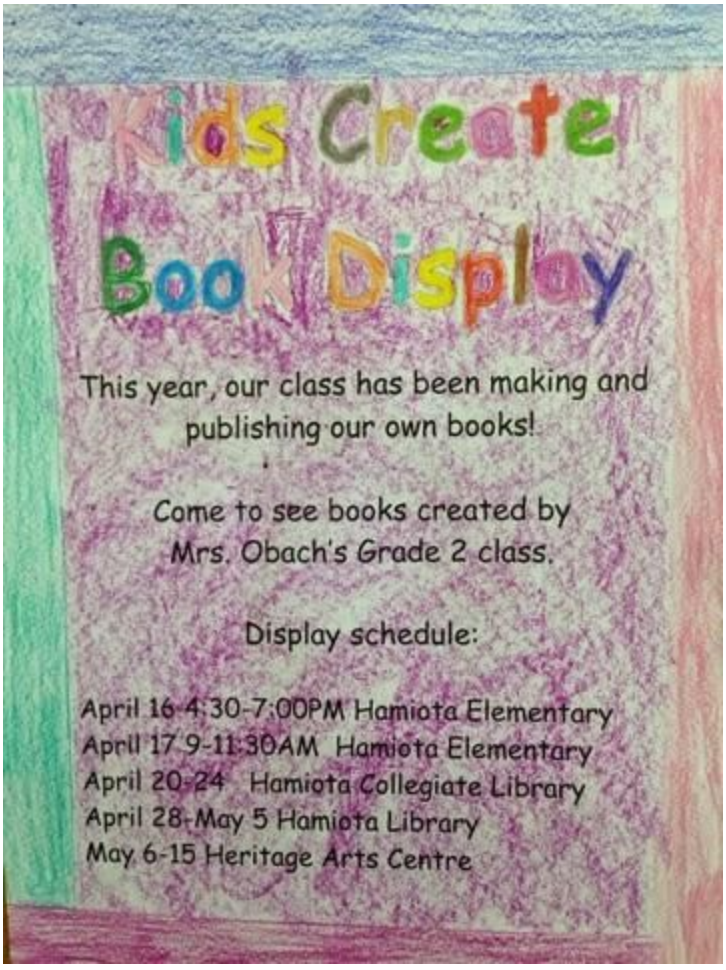
The student authors also Skyped into other classrooms to read their stories aloud for "Skype storytime". This was an opportunity for students to get feedback on their stories and to share their work with an audience outside of our classroom. Sharing the stories with Devon's Kindergarten class got them "hooked" on the Pigeon too and they learned about Mo Willems' books, illustration style, writing style and characters, enabling them to collaboratively write a pigeon book of their own!

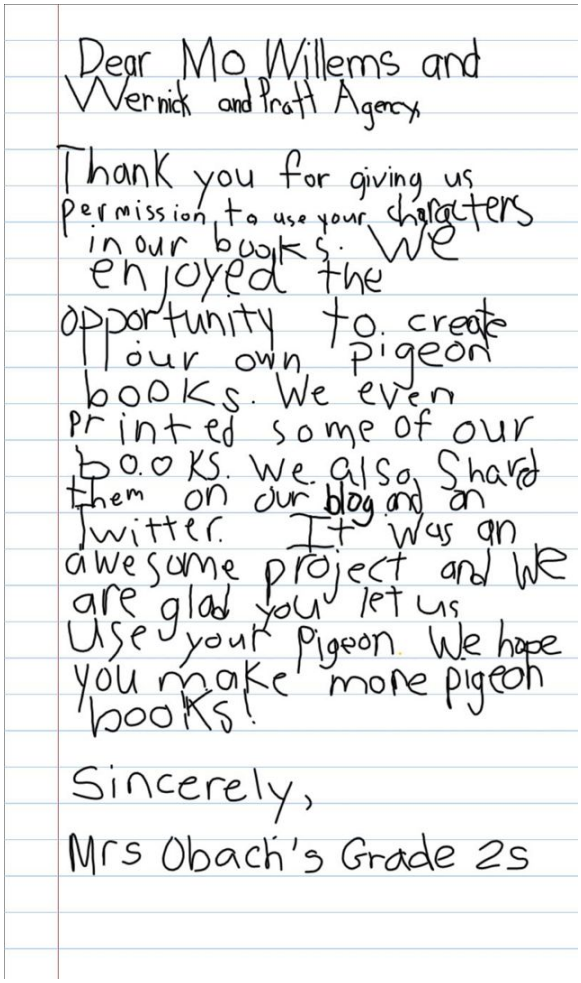
Skype story time

Although the students were very excited to have their books published online, they really wanted to print their books out. So, the class helped apply for grant funding to have their books printed. Leah's class was thrilled when their school division granted the funding and they were able to order printed copies of the books! Even though the young learners had already read the stories over and over, students spent hours reading and re-reading their books when the printed copies arrived. They were so proud of their work and eager to continue sharing their books.

Partnering with the local arts centre and local libraries, students organized a travelling book display to share the printed copies of their books with even more people! Students planned the schedule for their book display and advertised the dates using posters in the community and social media. As each book display date approached, Leah's class carried the display materials and books to the next venue and set up the display. It was great for these young authors to be out in the community and the local librarians and arts center coordinator welcomed them wholeheartedly. Following the book display dates, the

student-created “Pigeon books” returned to the school where they continue to be read and enjoyed by many students.





Dear Mo Willems and Wernick and Pratt Agency

Thank you for giving us permission to use your characters in our books. We enjoyed the opportunity to create our own pigeon books. We even printed some of our books. We also shared them on our blog and on Twitter. It was an awesome project and we are glad you let us use your pigeon. We hope you make more pigeon books!

Sincerely,

Mrs Obach's Grade 2s

Kids Who Code: http://mrsobachsclass.blogspot.ca/search/label/Kids%20Who%20Code

The Kids Who Code Code-a-thon is a student-led coding event held in celebration of Hour of Code, during Computer Science Education week. The first event stemmed from a collaborative project between Devon's Kindergarten class and Leah's Grade 2 class. The Hamiota Elementary grade 2 students learned to code using a variety of kid-friendly coding tools in preparation for teaching others how to code during the Code-a-thon. The inaugural event was co-hosted with Devon's Kindergarten class at Oak Lake Community School. The Kindergarten class used a project-based approach to plan the event with support from the Grade 2 class. Local government, school boards, parents, teachers, pre-service teachers and students attended this event. By working together, the two classes managed to host an event that exposed over 150 people to computer science activities. In the planning and preparation for the event, students also reached out to other classrooms who code, coding experts and coding app-developers through Skype and Twitter. The event was successfully replicated in 2015 using a similar approach to reach over 140 people!

Kids Who Code Launch: This connected classroom project started with three educators coming together to investigate coding in the classroom, supported a MTS Reflective Professional Practice Grant. During a launch meeting, the educators set goals for the project, investigated coding tools and teacher resources. They also signed up to host an Hour of Code™ event. Devon and Leah decided that a

student-led approach to hosting the event was the best fit for their teaching styles, so they asked their students if they wanted to plan and host a special coding celebration.

Kids Who Code project goals:

- explore coding tools with K-2 students
- provide opportunities for students to try coding, using a variety of tools
- get involved with the Hour of Code movement
- document professional learning and students' learning

Introducing and Evaluating Coding Tools: Leah introduced a variety of coding tools to her grade 2 students and gave them time to tinker and explore each different tool briefly. Students used different devices to explore a variety of coding tools including Lightbot, Hopscotch, Kodable, Code Monkey, Scratch Jr., Tynker and Daisy the Dinosaur. These initial explorations were typically preceded by a short demonstration or a short video tutorial. The instructions/demonstrations were minimal since Leah had limited experience with these tools and she wanted students to discover things on their own. Due to the number of devices in the classroom, students worked in pairs or small groups to spend about 10-15 minutes with each coding tool over the course of about 1 week. Her class decided on some important characteristics of coding tools and, after trying each tool, students used a simple 5 point rating scale to evaluate the tools. Students also gave comments and suggestions. In response to a student suggestion, Leah's class sent these evaluations to the creators of the app/tool via Twitter. Some developers even replied to the class to thank them for the feedback.

Tool: Tynker App

Fun: 3/5
Challenging, but not too hard: 3.5/5
Characters: 5/5
Sounds: 3.5/5
Easy to use: 4/5

Comments:

- It was fun to design characters
- There are a lot of different activities in Tynker
- Some parts were too hard for Grade 2s, but other parts were just right
- There are easy games and hard games. Some of the coding was too hard for us.

Tool: Kodable

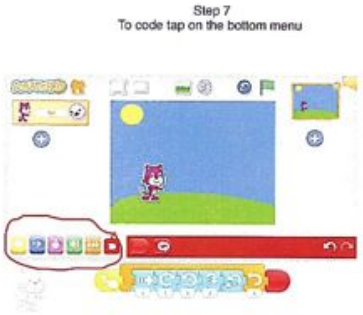
Fun: 5/5
Challenging, but not too hard: 4/5
Characters: 5/5
Sounds: 5/5
Easy to use: 5/5

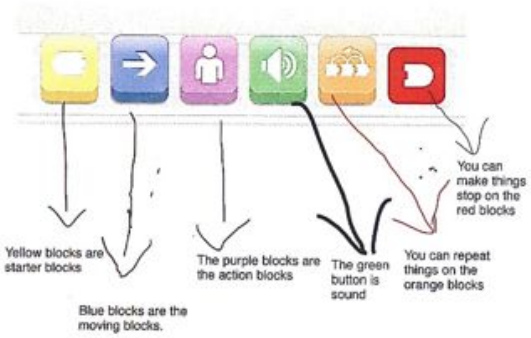
Comments:

- cute and cool characters
- nice, calm music
- shows you how to get started

Becoming Coding Experts: When preparing to host the code-a-thon, Leah's students agreed to become the "coding experts" and teach others how to code. With this goal in mind, students selected a coding tool to "specialize" in for the event. They worked in small teams to become experts with their selected tools and develop activities for Code-a-thon attendees to try at the event! Students were in

charge of exploring the app and becoming familiar with how to code using the specific tool. Each team also created a set of instructions with text and screenshots. Meanwhile, Leah's class also supported the Kindergartens as they planned the details of hosting the event at their school.





Click here to see their instructions for Kodable, Tynker, Hopscotch, Code Monkey, Lightbot, Scratch Jr and Daisy the Dinosaur!

A project-based learning approach:

As Leah's boys and girls worked hard to become coding experts, Devon's kindergarten class planned the event using a project-based learning approach. Although the planning process was multi-disciplinary, it was exciting to see the number of outcomes achieved in various curricular areas.

ELA: shared writing to develop a guest list and draft a message for the invitations, addressing invitations, printing signs for each coding station,

Art: invitation design and photography, designing the coding learning space in the school gym

Math: counting guests and tracking replies, measuring the school gym using non-standard measurement to design the coding learning space

Social Studies: creating a map to represent the school gym and the designated areas for coding stations and snacks

Making Connections: While preparing to host our code-a-thon, both classrooms made connections beyond the two-classroom partnership. One highlight was an exciting four-classroom Skype conference call about coding. Students from Devon's and Leah's classes met students from Ms. Page's class at Forest Hills Elementary in Wilmington, NC and from Mrs. Lowe's Class in Winnipeg, MB. Each class shared some of their experiences with coding and students had the opportunity to share some of the coding tools they had been using.

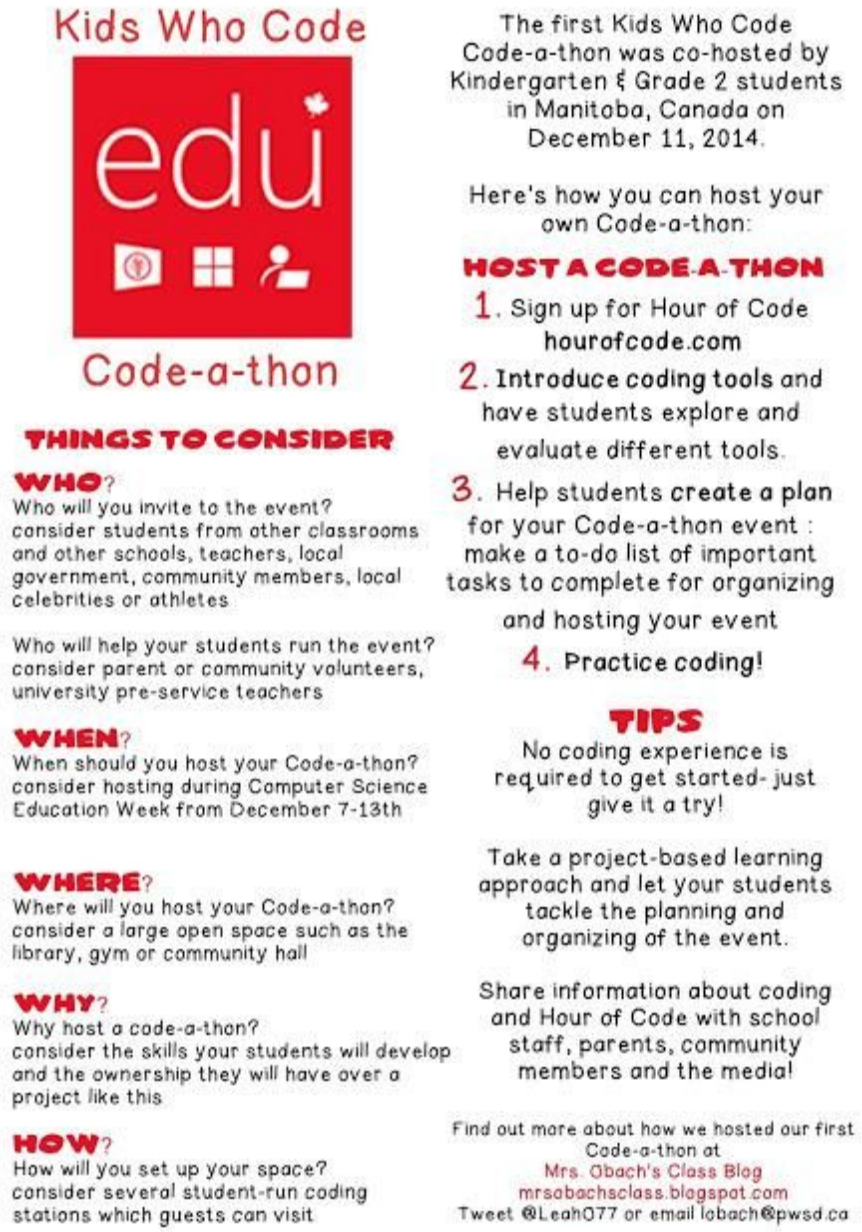
During the call, Ms. Page's class showed the other classes The Foos- a coding tool that the other classes had never seen before. The students in Ms. Page's class explained how much they enjoyed the app and even gave a quick demonstration. As soon as the call concluded, students were asking to try out this new tool. Since Leah's class was so excited to try out this new tool, they explored it the following day. Leah reflects that she was impressed at her students' ability to work with a brand new tool so confidently. She watched and listened as students tackled new programming tasks and worked with peers to overcome challenges. It was evident to both Devon and Leah that the grade 2 students were building their skills as young coders and taking their job of becoming coding experts very seriously.

Coding Experts : When preparing for the code-a-thon events, students had the opportunity to meet with coding experts. For example, students planned questions for a Skype call with guest speaker Grechen Huebner, who is the founder of one of their favourite coding tools, Kodable. Being a curriculum programmer with the company, she was able to answer students' questions and share much interesting information with them! Students also connected with educator and coding expert, Mr. Brian Aspinall, for a Skype question and answer session. Students were excited to find out about his coding background and also his middle years classroom.

Kids Who Code Code-a-thon: Both the 2014 and 2015 code-a-thon events were very successful. There was strong attendance, with guests representing various partner organizations and classrooms. Guests have included school board members, municipal and provincial politicians, community members, parents, celebrity coders and multi-age students. Volunteers from the Faculty of Education at Brandon University have donated their time at the code-a-thons. Despite the varying ages of the guests and students in attendance, the young learners in Devon's and Leah's classes confidently led coding activities. Devon and Leah feel that one of the most rewarding aspects of this event was witnessing how empowered their students were by the opportunity to share their skills and knowledge.

2014 event video: https://www.youtube.com/watch?v=wVr9tSJNyhk

Hack the Classroom coding video: https://www.youtube.com/watch?v=wVr9tSJNyhk



Love, Family Adoption Project: Mrs. Caldwell's Senior Kindergarten Class

A very special little girl in Devon's senior kindergarten had lived with her foster family since birth, and one day last spring she announced that she had exciting news. Devon quieted the class and asked her to share it with everyone. Everyone was so happy when she shared that her mom and dad were adopting her! All of the students were eager to know what adoption meant. Before Devon launched into a long, complicated explanation, she asked the little girl if she could explain it to the class. "Yes, " she answered confidently, "It means that I get to live with my mom and my dad and my sister and my brother forever and ever."

Devon explained to the class that this was a big deal and asked them if they would like to help their friend and her family celebrate. "Yes!" they said enthusiastically, "Let's have a party!" And so began

another interdisciplinary project-based learning experience in Mrs. Caldwell's kindergarten classroom.

What were the steps in this project?

1) Through shared writing on our SMART Board, the boys and girls wrote a letter to Mrs. Masson the principal) asking for permission to have a party.
2) Used shared writing to write another letter to the custodian asking if he would help set up the party.
3) Once approval was granted, Devon and the kindergarten students made a to-do list. Their lists basically served as Devon's lesson plan and guide for the project; they referred to it several times a day to stay on track. Based on the list, Devon designed learning experiences focused on kindergarten curricula to give her learners the skills they needed to successfully complete the project.
4) They used shared writing to print a guest list that included school board members, senior administration, all families, all staff members, the student's bus driver, and Child and Family Services workers. Together they decided to collect donations at the door for Child and Family Services Foundation to help kids and families in care.
5) Kindergarten students used a hundred chart on the SMARTBoard to track how many people were invited and how many people replied that they were coming. Boys and girls printed numbers from 1-100 as they tracked attendance.
6) They designed invitations using Microsoft Publisher, focusing on ethical and responsible use as they created their own images rather than use someone else's work. The students decided on a dress code: pink for the girls and "handsome" clothes for the boys.
9) Using shared writing, they wrote a post on their classroom Facebook page requesting that families send pink food and pink drinks for the party as it was the little girl's favourite colour.
10) They folded invitations in half (great math connection) and addressed envelopes (visual-motor coordination was strengthened as they copied off the SMART Board).
11) Boys and girls made decorations for the classroom, all in pink of course, and a huge B for the door with pictures of the special student.
12) Guided by Devon, learners selected two songs to perform: Skinnamarink and I Love You, You Love Me.
13) Together they wrote a classroom Facebook post asking parents to send a family picture to Mrs. Caldwell
14) The class used Animoto to make a movie that showcased everyone's families. We wanted our party to celebrate ALL families!
15) The students designed a special framed picture of our student for everyone to sign as a guest book.

Here's what the big day looked like:

Our families provided delicious pink treats!

The guests of honour pictured above

It was extremely emotional when boys and girls sang their special family songs!

The party was a huge success and very well attended. Devon and her school found it exciting to involve stakeholders such as Child and Family Services in a different, happier context. $113 was collected for Child and Family Services Foundation which was a great opportunity for kindergarten students to count coins and bills by 1s, 2s, 5s, and 10s. The adopted student and her family were honoured, and it was emotional and touching to celebrate such an important event. This was an unforgettable day that was one of the most special experiences in Devon's kindergarten career!

In Closing

Teaching in a connected classroom enhances learning and teaching in many ways. Educators work together to support each other and co-teach, which often leads to stronger teaching and heightened accountability. Teachers who go beyond the walls of their classrooms are engaging in professional learning and reflection as they expand their skills and knowledge. Taking advantage of classroom connections also gives educators access to a plethora of resources that might not be otherwise available. Working in partnership with others helps educators to foster rich, deep, meaningful learning. Because of these exciting learning experiences, teachers who make connections are often the most passionate, driven and engaged professionals. It is inevitable that an educator's passion and enthusiasm will positively influence learners.

While student learning is the chief goal of connecting classrooms, there are many other benefits for students. Although students may already know how to connect with others socially, it is important that they also learn to connect in order to work towards shared goals. Learning in a connected classroom fosters citizenship skills and empowers students to take action on important issues. In addition to meeting curricular outcomes, students are practicing relevant skills that will serve them well as learners, community members and employees. Learning to effectively communicate ideas, negotiate with others and self-regulate are essential skills for today's learners. When students are able to identify problems and issues in their local and global communities, form partnerships, leverage resources, and take action, it is very powerful indeed. These are the people we want in our classrooms and our communities, making a difference for a better world.

"Don't ask kids what they want to be when they grow up but what problems do they want to solve. This changes the conversation from who do I want to work for to what do I need to learn to be able to do that." -Jaime Casap

Leah Obach is an early years teacher from rural Manitoba. She is passionate about improving education through strong classroom practice, presentations at education conferences and mentoring other educators. She strives to engage her students in meaningful learning experiences, while fostering the development of important 21st century skills. Project-based learning, technology infusion and cross-classroom collaboration are important components of her classroom teaching. Leah has been recognized for her commitment to best practices in teaching. Most notably, she was selected three times to represent Canada as a Microsoft Innovative Expert Educator and, as an alumna of the program, she is now designated a Microsoft Expert Educator Fellow. Follow her on Twitter @LeahO77 or read more on her classroom blog mrsobachsclass.blogspot.com

Devon Caldwell is a kindergarten and resource teacher at Oak Lake Community School in Manitoba, Canada. Devon is passionate about infusing technology to foster collaboration, inclusion, and innovation among students, teachers, and their local and global communities. In 2009, she graduated from Brandon University with a Master of Education degree in special education. Devon participated in three Microsoft in Education Global Forums, and her collaborative project with colleague Leah Obach won first runner up in Extended Learning Beyond the Classroom (2012). In 2014, her project with an international team of educators received first place in the gender equality category. Honours include designation as a Microsoft Innovative Expert Fellow and recipient of a Canadian Prime Minister's Award for Teaching Excellence, Early Years Teaching Excellence Award from her school division, and ManACE Educator of the Year Award. Devon is an enthusiastic contributor to online professional learning communities and loves mentoring educators and pre-service teachers. When she is not in her classroom, she can be found on her yoga mat or travelling. Follow her on Twitter @india0309 and explore her blog at Kindergarten Diva. Devon can be reached by email at dcaldwell@flbsd.mb.ca.

Chapter 7 - The Benefits of Social Media in the Elementary Classroom

Zoe Bettess

Neil Postman (Postman, 1998) said; “a new medium does not add something, it changes everything.” I have been using various technology apps and sites with my students for the past four years and this experience leads me to agree with Postman. New technology integrated into my classroom has changed many aspects of both my teaching practice and my students’ learning. These changes have included gaining new skills and learning experiences, increased collaboration with other educators from around the world, and the discovery of new voices and ideas. Using social media has also opened opportunities to explore being a good citizen in a digital world.

Let’s explore some of the amazing benefits that technology has brought into my classroom. The first benefit is increased engagement. Having increased student engagement allows for smoother classroom management. For example, I don't have to get after my students to be on task as often since they are engaging in the task at hand or the discussion taking place. Having increased engagement allows for students to be more successful in their learning, which comes clear when it comes to assessment.

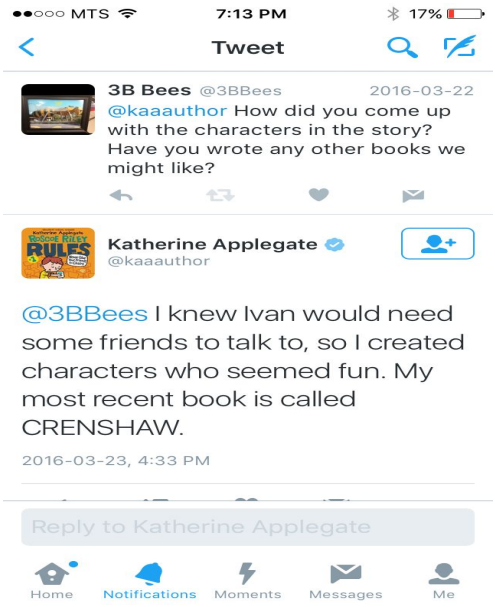
There are many different ways that technology is used in my grade 3 classroom that result in increased student engagement. Let’s start with blogging. I am a big promoter of the use of blogging in the classroom for several reasons. Other teachers ask me why it is better than traditional journals, in addition to the fact that I don't have to bring home 20 notebooks to mark, blogging has led to increased student engagement. The students are engaged because they find it fun to blog. I am not sure the exact reason for this higher level of engagement when blogging as compared to writing in their journals, perhaps it is because they to get to share their writing with a wider audience, including their classmates, classes around the world, as well as their with their parents. It may also be because they can easily fix up mistakes and don't have to worry about the neatness of their writing. What I do know is that students can be in different spots in writer’s workshop and on different writing topics, yet, they will all be working in silence (well other than the tapping of the keyboard keys). They can flow from stage to stage without interruption.

Another benefit of our technology use is the voice that has developed for students who struggle to write in their notebooks due to fine motor skills. I have realized that blogging, in particular, has led me to the discovery of students sharing their voice with more ease. I don't really know why, but my reluctant writers seem to enjoy writing if they can blog and will choose it in Daily 5 for that reason. I hadn't explored the why of this until a few years ago when I was questioned on Twitter about why I think it transforms some of my students into less reluctant writers. I really didn't have much of an answer, other than my guess that it was that they find it easier to to type out due to issues with fine motor skills. After being asked about it, I decided to investigate it further the next day. We had Daily 5 in the morning so it was the perfect time to go and inquire. During Daily 5, I got down on the mat with one of my reluctant pencil and paper writers who loves blogging, he often picks writing during Daily 5 and blogs rather than using paper and pencil. This time he was actually writing in his notebook, but that wasn't by choice. Our Internet wasn't working so he had to write in his notebook. I laid down on the floor and started recording his answers to why he liked to blog. I teach grade 3 so they aren't always able to explain why they prefer one method of writing or learning over another, so with some questioning I was able to reach some sort of

an explanation. He prefers it because he doesn't have to worry about being neat since he doesn't have the greatest fine motor skills. Blogging allowed him to express his thoughts in a more comfortable manner. My understanding is that it is easier for him to type than print since he doesn't have to focus on the organization part. Then I moved onto another student who isn't a reluctant writer in the sense that he won't write, but rather, that he won't write as much as he is capable. His view was similar to the previous student. He informed me that he finds it harder to write on paper because he has to worry about how the letters should appear and where they should go and he spends too much time doing this. When he blogs, the letters are there on the keyboard and he doesn't have to worry about perfectly placing them in the right spot. He felt like he can get his words out faster when blogging and, thus, is worry free. I can definitely see this in action, considering that within twenty minutes he blogged two well written blog posts using his mother's iPhone while at the airport.

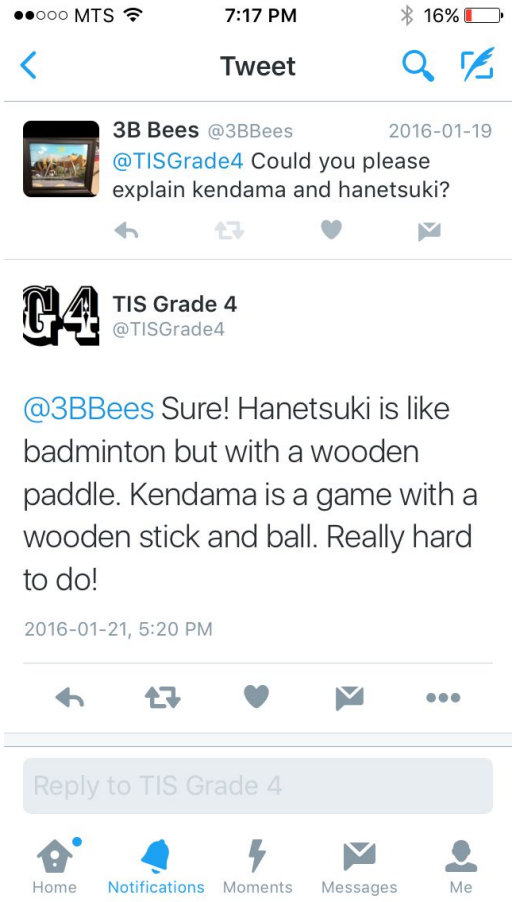
An additional benefit to blogging is that once the posts are approved by me, they are automatically out there for an audience to choose to read. My students are able to choose which classmate's blog they want to read and comment on. I don't force them to comment on any specific person, other than during our interactive literature circles. They have a global audience and everyone, including their parents, can see their work. It has been great for parents to have a sense of what their child is learning in school and see their writing progress over the course of the year. In the past, I have had parents mention to me how they love seeing their child's writing and will comment on it. Their feedback gets students excited and encourages them to continue blogging. Comments from other classes elsewhere have had the same effect as well.

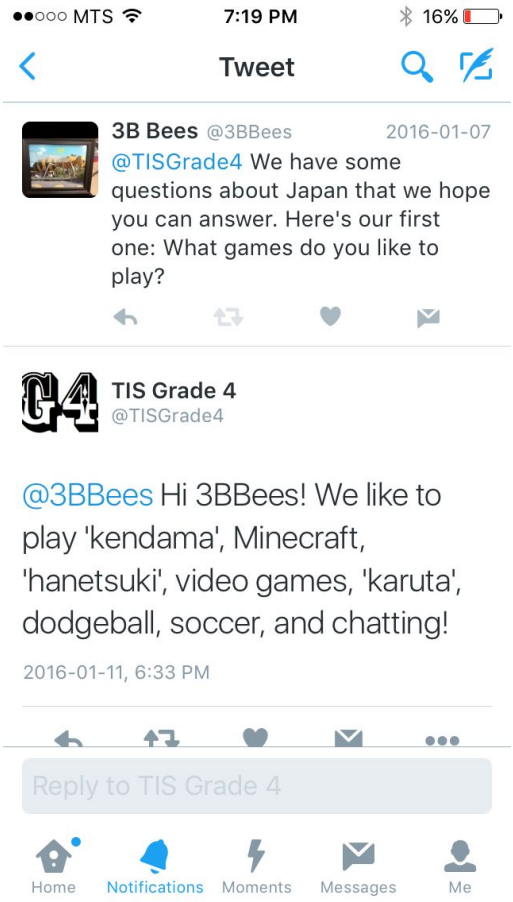
Another type of technology tool that we use that allows for student learning and engagement are video tools, such as Skype or Google Hangouts. These video-conferencing technologies allow my students to interact with other students from all parts of North America and even the world. It is a great way to talk about our learning. My students over the past few years have had the opportunity to; have the author of our read aloud story use Skype to connect and be our guest reader, do mystery number Skypes, Skype with classes in other cities and countries to learn about their communities, teach some teachers how to do mystery number Skype, Skype with a Hutterite colony to learn about their indoor garden, taught and learned from our Skype book buddies, Skype book chats, and Skyped with experts on various topics under study. It is pretty easy to see students' high level of engagement by the way their eyes were glued to the screen and by their big smiles. One such time was when our book buddies from a creative writing class in Winnipeg were skyping with us to read *Mortimer* by Robert Munsch. The students on my end were smiling all throughout the story as they listened. It was fun to watch both sides smile and get into the story.



Tweeting as a class also provides engagement as students are excited to connect to classes from other places as part of their learning. We tweet our questions to countries around the world in order to learn about life in different communities as part of social studies. We tweet with our favourite authors and the students are so excited when they get a reply back from

the author (some example exchanges are below). We've tweeted leaders (such as MLA's/MPs/mayor/Premier) and received answers to our questions. One student had become very engaged in the lesson about Earth Day and she was upset when she saw trees being cut down behind our school. She wanted to know why it was happening. So we tweeted the City of Thompson to inquire, and they answered, giving us a phone number to call to get more details. So off we went to call them to get answers. The student remained engaged throughout the entire process and was satisfied with the answers she received. This simple exchange showed students how they can use social media to find answers to their questions. It also was an opportunity to practice digital citizenship by respectfully asking questions.

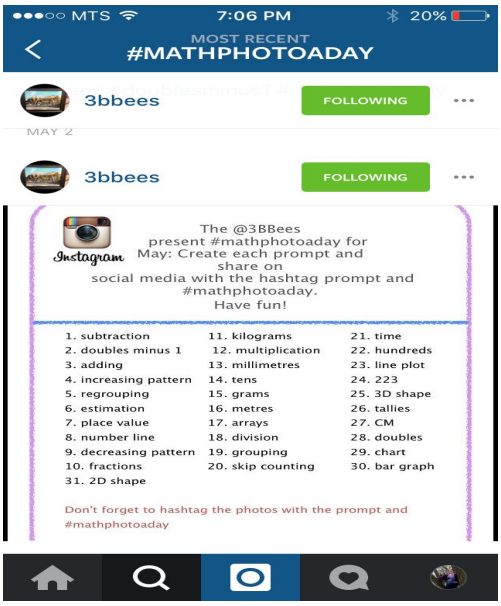




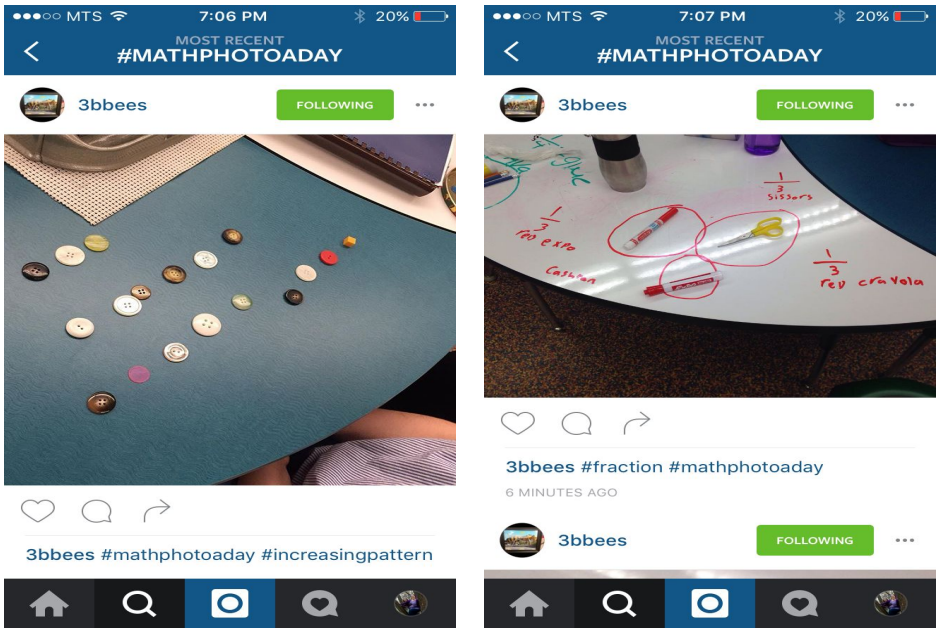
One of the best moments that illustrates how my students benefited from using social media, and one that led to high engagement, came during the 2014 Winter Olympic games. In my preparation for our Olympic unit for my grade 3 class, I was wanting to connect with some Canadian Olympians on twitter to ask questions to about being Olympians. The Canadian Olympic Team responded on twitter pointing me to the web site *www.olympic.ca*. On this site you can see which athletes are on Twitter and can then ask them directly if they would answer our questions. So, I went to see which athletes were on twitter and tweeted the more active ones to see if they would be willing to answer a few questions from my class. I thought maybe one or two would respond since they would be busy getting ready for the Olympics, after all they were coming up soon! I was way off in my prediction, within twenty-four hours I had received responses from fifteen Canadian Olympian athletes! I wanted to easily find the tweets for when we started our Olympic research so I came up with the hashtag #olympianchat and off we went. We tweeted many

athletes and received some amazing answers (See a few of the twitter exchanges below). Some of the athletes even addressed the students who had tweeted them personally, using their names. It made their day to have a tweet addressed directly to them! How exciting! One of their favourite athletes tweeted them during the opening ceremonies that we were watching live. When they saw these athletes competing they felt a real connection to them. As a result of this connection, the students even showed empathy for the one bobsledding team who had flipped their sled over during the race. They came into the classroom all upset and wanted to tweet the driver of the sled to make sure he was okay. This activity, while it took some time in and out of class to do, was an amazing learning experience for my students. It was very engaging, and students learned many lessons in digital citizenship. It allowed them to have a voice that was respected and heard and helped meet some important learning outcomes as well. In this case, the trade-offs were truly worth the time invested, this learning was authentic and meaningful for my students!

Another hit with my 3B Bees is *#mathphotoaday*. This experience involves both twitter and instagram in an engaging challenge. When participating in this challenge students come into class in the morning and have the math prompt on the board to complete. Most groups are done creating their mathphotoaday concept before the announcements are finished - such engagement! Photo challenges like #mathphotoaday allow students to connect with students outside of our community to see how they interpret the math concepts. As well, students can ask the contributors questions and answer the questions they pose in return. It is just another great way to connect using social media. Another amazing outcome of the challenge is the creativity that comes with it. We talked as a class about boring ways to show some of the math photo prompts and the students then started coming up with creative ways to create and show a math concept instead. For example, we showed skip-counting by using people. We had a row of 3 people, a row of 6 people, and a row of 9 people. Last year our principal and vice principal got in on the skip-counting #mathphotoaday. It is my belief as a teacher that student engagement is crucial for learning to happen and #mathphotoaday, and other photo challenges are a great way



to do this. These activities also allow for collaborating, connecting, and creating



The #mathphotoaday challenge leads us into another benefit we've experienced from adding technology into our learning: collaboration. Students collaborate in their groups to come up with a way to show the concepts in a photo. They are actively engaging in a math conversation about what ways they can show the math prompt. They work together and try different ways to illustrate the concept. These skills are often transferred into other areas of our learnings as well.

We've, also, experienced collaboration when Skyping with our friends in different countries for research. We teach them about Canada, and they teach us about their country. We also Skype to take part in various learning experiences, including the massive collaborative project Global Read Aloud (*theglobalreadaloud.com*). The students love to collaborate through Twitter and Skype in order to take part in discussions about the book being read. It is a hit every year.

As Neil Postman said; "a new medium does not add something, it changes everything." Technology integration, when balanced with other ways of learning and sharing, has led to so many gains in my classroom. We are no longer isolated but connected to the world around us, whether it be 8 hours by car to Winnipeg, or 24 hours or more away by plane, or by the simple use of technologies, such as video conferencing or social media. We have learned from other classes from around the world, and we have also taught other classes as well, all through digital technologies. I wouldn't trade the benefits for anything. I can't imagine not being able to teach and assess the way I do now through the use of technology, it has added so much that is positive to our learning. We are no longer isolated in our classroom, and it will stay that way.

Reference

Postman, N. (1998). *Five things we need to know about technological change*. Retrieved from https://www.student.cs.uwaterloo.ca/~cs492/papers/neil-postman--five-things.html

Zoe Bettess is a grade 3 teacher in Thompson, Manitoba who believes in the power of technology in adding to students learning experiences. This is her ninth year of teaching,

Chapter 8 - Blogging in the Classroom: Knocking Down Walls & Expanding Opportunities

Kirsten Thompson

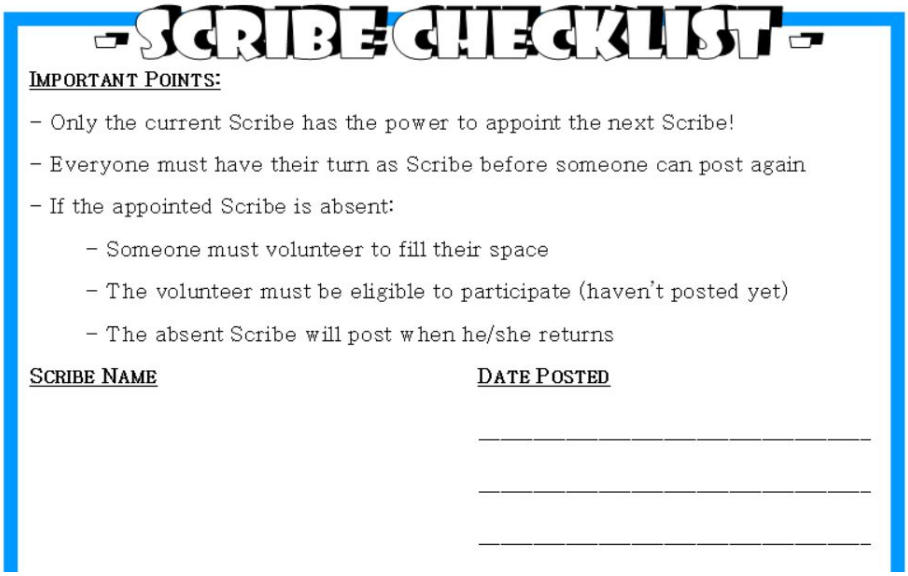
I had been blogging about my adventures as a pre-service teacher for almost two years when I enthusiastically walked into my first classroom. I had documented and shared everything as I studied for courses, attended various PD sessions, navigated student teaching placements, and dreamed of what my own classroom would eventually look like. Blogging not only provided me with a platform to reflect on my experiences and document my growth but also to gain valuable feedback from people all over the world and develop relationships that I still cherish today. I had first-hand knowledge of the benefits that could come from sharing through a blog and wanted my students to be able to experience these as well. With that dream in mind, I got set on addressing the logistics of my reality.

Ste Rose School, in none-other than Ste Rose, Manitoba, is a K-12 school of approximately 200 students from primarily rural agricultural backgrounds. One of the fun quirks of being in a small school is that you get a "catch-all" in regards to your teaching schedule. For example, I have worked with fourteen different curriculums and spanned six grade levels over the course of three years in the classroom. One of my first questions was: what students do I want to blog with? Part of me wanted to dive right in and blog with *every* class but logic quickly won me over and I decided that starting with one class would be a much more practical route; there would always be room to expand in the future. Of all my students I saw my Grade 8 students most frequently as I had them for both math and science; the decision was made to start our blogging project with them. A background in science tilted my personal favour in that direction and I independently decided that our blog would be implemented as part of our science class.

The "Learning Scribe" Author System

The initial vision of how our classroom blog would function was inspired by a discussion I had with Darren Kuropatwa regarding the "learning scribe" system he utilized in his high school math classes. It was quickly decided that we would use one blog that would remain logged-in on our classroom desktop computer; this allowed us to bypass student email systems, author invites, and at-home monitoring. Every student was expected to take turns writing a post that summarized the activities that occurred in the

classroom on that particular day. The learning scribe system began with one student volunteering to write an initial post (this often included rounds of "rock-paper-scissors" to determine the winner). From this point forward the next author was selected by the author from the previous class; no student wrote twice until everyone in the class had a turn. If the previous author happened to be absent and was unable to select a candidate then we just went back to the volunteer system for that class. Once every student had an opportunity to post then the process started over again. This system worked well in our class because it allowed the students to take control of the project and it wasn't a situation where I, as their teacher, was assigning a blog post for the day.



TIPS

- We kept a copy of the class register next to the computer so the class scribe could quickly tell who hadn't had an opportunity to blog yet (see image above)
- For younger classes: if you assign classroom jobs you can have a student who is responsible for getting the computer logged on and have the blog loaded at the start of class so there is no delay when it is time to blog

What Should We Write About?

When the idea of blogging was first introduced to the students we spent an entire class period looking at different blogs to see what their posts looked like. We explored other student blogs from various age groups but also used Google to find blogs written about topics that interested them. As a class we then brainstormed what we wanted our posts to look like based on their interests and how they wanted to use their blog. We came up with the following list:

"We can use our blog to:

- Share our learning with an authentic audience
- Catch up on lessons that were missed due to absence
- Review lessons to get a better understanding
- Connect with other classrooms around the world

- Integrate multimedia of all descriptions (text, images, videos, podcasts)
- Practice responsible digital citizenship
- Receive feedback from others”

Their posts would include copies of notes that were written, explanations of assignments/activities, questions they had regarding the material, links to websites we visited, pictures of what went on in the classroom, embedded videos; the content of their post was only limited by their imagination and effort

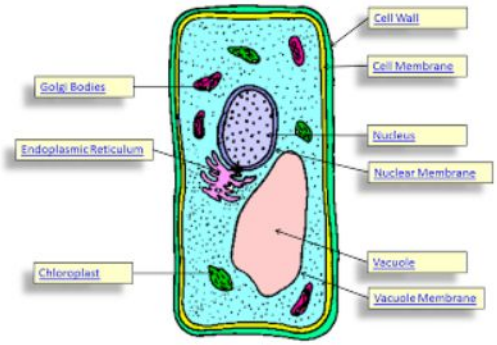
Wednesday, September 25, 2013

UNIT: Cells and Systems

Today we reviewed the differences between plant cells and animal cells.
(ex) PLANT CELL&ANIMAL CELLS- both have:
-cell membrane(skin)
-vacuole(stroage)
-nucleus(brain)
-Endoplasmic Reticulum(freeway)
-cytoplasm(transportation)
-mitochondria(breaks down your food)

PLANTS ONLY(otherthan the ones above)
-cell walls(extra shell)
-chloroplasts

We also drew a cell. It could ither draw a plant cell, or an animal cell.



parts of a cell plant. (2013) uploaded by unknown.available at http://ghills.metamora.k12.il.us/webquest/5th/plants/plantcell.htm

TIPS

- Write the first few blog posts collaboratively on an interactive whiteboard to familiarize students with the blogging platform and how it functions
- I provided students with a post checklist that helped outline what a good blog post needed (content, links, visuals, references, proof reading, etc)
- Don’t set minimum/maximum word limits; let students determine what is appropriate based on the activities going on in the classroom, ability level, etc

- You can have a list of blogging prompts available for students in the event they need some encouragement to begin their post. This can be provided by you independently or created as a large group before starting a blog
- I purposefully decided to not edit any student posts. All the posts on their blog include their own raw ideas, word choices, and formatting styles; their individual personalities is very evident
- Revisit your school's media and sharing policies before allowing students to post classroom pictures (I also had parents/guardians sign a consent form specific to our blog at the beginning of the year)

How Does Blogging Fit Into Our Class Schedule?

At the start of every class period I ensured that the blog was up and loaded on our computer and ready for student use. Students would independently select the class scribe for the day while I took attendance. The scribe would sit at the computer and begin formatting their post based on the class schedule that I had posted on the whiteboard. Being the class scribe is relatively flexible in our classroom. Students can sit at the computer and write any notes directly into their blog post, they can bounce back and forth between group work and the computer, they can take pictures/videos of activities and upload them into the computer; we didn't have any hard or fast rules. On days where we had guest speakers or were completing experiments I encouraged students to refrain from blogging during the class so that they could fully participate in the event and then they could blog about the experience in the next class period. Students would sometimes choose to revisit their blog posts and make edits if they had free time while in my classroom or during their breaks during the day.

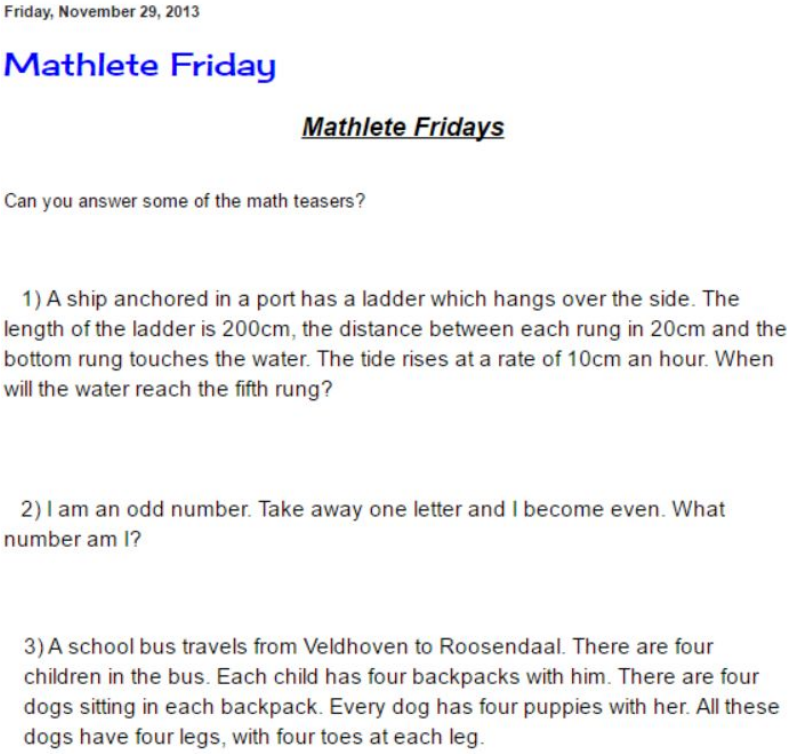
I made time each week for us to visit our blog together as a class using the interactive whiteboard. We would highlight the different posts created by the week's scribes, read and answer any comments, and check out our blog statistics. This was often a highly anticipated classroom event as students loved seeing what types of comments their posts received and where in the world their blog views were coming from. This lead to the natural development of their own Personal Learning Network (PLN) because students would start discussing how they could tailor their posts to assist them with what they were doing in the classroom and how they could share their post to reach a larger audience. While our school has social media sites filtered through our network, students would choose to share their posts through Facebook, Twitter, or Instagram on their own time; resulting in feedback from university students, professors, and celebrities!

TIPS

- Determine your own expectations regarding a blogging schedule and incorporate a class routine to match; stick with it!
- Use a laptop or tablet for blogging if you have these resources available; we often felt very limited by our desktop station
- If using multiple devices in the classroom make sure you have the necessary cords/adaptors/etc so students can quickly transfer and upload pictures/videos to their posts

The Benefits

I would like to think that all of my students have recognized the value that blogging can have on their learning; don't we want that for every activity we do in the classroom? I hope that they feel that our blogging project has successfully met the seven goals we outlined as a class at the beginning of the year. Any project, however, is not without its share of hiccups. There will always be students who don't want to participate, blog posts that glitch and randomly delete, formatting that just won't function the way you envision, and internet signals that shut down mid-class; but the good experiences far outweigh the challenges. From my perspective, I feel that our classroom blog has been a success because my 2013/2014 grade 8 class decided to independently incorporate a special series titled "Mathlete Friday" into their blog because they wanted to blog in math class on their own time. These posts sometimes covered aspects of what we were learning about but often included math jokes, games, riddles, etc that were independent from what we were doing in the classroom. How often are students exploring different math avenues on their own??



Friday, November 29, 2013

Mathlete Friday

Mathlete Fridays

Can you answer some of the math teasers?

1) A ship anchored in a port has a ladder which hangs over the side. The length of the ladder is 200cm, the distance between each rung in 20cm and the bottom rung touches the water. The tide rises at a rate of 10cm an hour. When will the water reach the fifth rung?

2) I am an odd number. Take away one letter and I become even. What number am I?

3) A school bus travels from Veldhoven to Roosendaal. There are four children in the bus. Each child has four backpacks with him. There are four dogs sitting in each backpack. Every dog has four puppies with her. All these dogs have four legs, with four toes at each leg.

Students always have an opportunity to tune in to our blog and know what is happening in class; regardless of if they can be there in person or not. Our school has multiple students with long-term absences that result in significant gaps in their education; these students are sometimes only present for one class in a month's period. After a particularly long absence, I welcomed one of our students back to class and began explaining what we were working on, to which she replied, "I know, I watched the video on the blog yesterday".

Every student has an opportunity to share their understanding and get meaningful feedback for their work. I had the wonderful opportunity to have two heavily modified students join me in my grade 8 science classroom after participating in independent programming out of the classroom for multiple years. Their blog posts were unedited like any of their peers but they did have the support of an EA who assisted in ensuring that their meaning was understood through transcriptions at the bottom of their post. Their

posts often received more comments than any of our other posts and they were absolutely thrilled to have their voices heard alongside their peers.


Tuesday, October 29, 2013

lab reports

scne is rell fun and enrat ;
Science is really fun and interesting.
wring in our pist adt prfm our lab reports
We are working on our projects about perfume. Our lab reports.

good lall perfume
Good smelling perfume.

tall ifre dab
Tell everybody.

Posted by Mrs T at 10:47 am 11 comments:
Recommend this on Google
Labels: from jessie

- Students were provided with an opportunity to learn from their peers. There were several instances where students would revisit their peers' blog posts when they had a question in class because they found it easier to relate to their peer's explanation than mine.
- My students are not limited by the walls of our classroom. They are able to connect with people all over the world, from all different backgrounds and they learn that they can learn and share with anyone, not just me and their local peers. Some of the most exciting moments through our blog occured when:
    - students blogged about the work of scientist Steve Spangler who personally responded to their questions shortly after appearing on the Ellen show
    - students shared a math video featuring Dr. James Grimes, who often appears on the popular YouTube series Numberphile, and he personally responded to their post and chatted about a recent trip "across the pond" to Canada
- Blog posts allowed students to see that there are multiple ways to learn about a topic and communicate their understanding. A lot of school activities still rely heavily on a student's ability to write and, while important, can be a big source of stress for students who understand the material but are unable to communicate that through writing. If students didn't feel comfortable with writing they could embed a video, record an audio file, include pictures; the focus did not have to be on text.
- Students have a safe and supported opportunity to develop their digital literacy and citizenship skills. Our posts allowed students to practice:
    - how to shape their digital footprint
    - how to set and maintain privacy settings
    - how and when to reference various digital medias
    - how to use multiple digital programs

- how to develop a PLN
- netiquette

Looking Back & Future Plans

I return to the classroom in the fall of 2016 after a year away for maternity leave. I will be coming back to a revamped teaching schedule and a new plan when it comes to implementing a classroom blog. Starting right at the beginning of September I will be blogging with my Grade 11 Canadian History students who happen to be my former Grade 8 students whom I blogged with for the first time in 2013. Their familiarity with blogging and their age level (upper high school versus middle school) has resulted in me making some significant changes to our blogging activity:

- Students will be logging in as blog authors using their personal email accounts rather than blogging from a pre-registered classroom account
- Students will be responsible for choosing when and where they blog as long as they meet determined expectations (1 blog post per month and 2 detailed comments on a peer's post per month)
- Blog posts will serve as part of a cross-curricular project for their English class (I'm very lucky to have a colleague who was willing to collaborate on this with me!)
- You can see exactly what students will be doing by checking out the Blogging 101 package I will be providing them with. Despite these changes there are still some aspects that I know I will keep the same:
- Writing our first few posts together. I think modeling expectations is important and taking a few classes to troubleshoot together can save a lot of time in the long run!
- Allowing students to use various forms of media to demonstrate their understanding. Students will be somewhat restricted by the added requirements from the English curriculum cross-over but they will still have the option of utilizing audio files, videos, images, etc in addition to written text.
- Taking time to highlight student work, share comments, view statistics, etc. It is important to showcase student work and it is fun to celebrate how our network is growing.

I am very excited to see how this new blogging adventure will be. As I look forward I envision this activity as in a constant beta-stage that will evolve based on my students needs/interests and available resources.

Kirsten Thompson is a rural educator in the Turtle River School Division where she teaches Grade 8-11 science, social studies, and math. She is currently working towards her M.Ed in the Curriculum and Planning stream where she aspires to focus on the purposeful implementation of technology to expand curricular expectations in the classroom.

Part 3 - Stories of Personal Transformation

Chapter 9 - Connecting & Sharing

Andy McKiel

My love of technology started at a very young age and it was long before access to a computer became the norm. In the world that I was growing up in, I had already begun to develop skills and abilities with computers that many of my peers didn't have. I devoted a great deal of my time and attention toward finding more and better ways of interacting with computers. The tips and tricks that I'd picked up along the way weren't things that I'd learned in school or read in books. I acquired these skills through hands-on learning and dabbling with the technology, through making mistakes and seeking solutions to the problems and challenges that I'd encounter along the way. I took the time to tinker and I have no doubt that much of my knowledge and interest in this area is a result of my dedication and commitment to learning about various ways of interacting with computers. I was driven to create and share digital artifacts as a young boy and that's always been at the foundation of my interest in the affordances of technology.

I still remember the first time I sat down to interact with a computer. It was a Hyperion computer that my Dad brought home from work and I had no idea at the time how enamoured I would become with one of the very first portable computers that the world had ever seen.

(Image sourced from http://oldcomputers.net)

I was a 10-year-old boy at the time and I can honestly say that I fell in love with technology in a heartbeat the instant I sat down with that Hyperion for the very first time. I'd always been curious about electronics and could regularly be found around the house dismantling and reassembling all kinds of small gadgets and appliances. But this was different. The first time I powered up the Hyperion and saw the cursor blinking on that small monochrome screen, awaiting input, something clicked.

I had to teach myself how to interact with that computer because it didn't do anything on it's own. I had to learn simple commands using MS-DOS to make anything happen. Whether simply clearing the screen or listing the file contents of a 5 ¼" floppy disk, I had to learn the inputs required to communicate my thoughts, ideas and intentions to that computer. From there, I quickly began writing simple scripts with the Basic programming language and I was captivated by the idea of coding. I quickly progressed to writing simple random number generator games with Basic that allowed my family, friends and I to all interact with that computer in ways that we'd never thought possible.

The idea of creating simple games on my Dad's Hyperion led to hours of screen time, but it also saved me lots of money in the long run. This was only a couple of years after the advent of modern day arcade games like PacMan, Donkey Kong, Frogger and Centipede. As a kid, I spent countless quarters supporting my video game habit so creating my own games was very liberating and, some might argue, better use of my time.

When my parents saw how captivated I had become by the idea of computer programming, they invested in a Commodore VIC 20. Now I had the ability to both program and play video games. I had the best of both worlds in one machine! Better yet, neither of my sisters had any interest in the VIC 20 so it was my little baby. Sure, I had to load Frogger and Centipede from a cassette tape over several minutes but it didn't cost me a quarter every time I ran out of lives!

Image captured from the following YouTube video:
Commodore VIC 20: A Visual History - https://www.youtube.com/watch?v=LSmUxP-Lghw

Some of my friends had Atari and Nintendo gaming consoles but that didn't bother me because I had my trusty old VIC 20. It was all that I wanted and all that I needed. I spent many hours gaming but I spent just as many hours programming and coding.

And then came the internet. The idea of networking computers and providing people in different places with the ability to communicate and collaborate in real time has rocked the foundation of the world that we live in. But it didn't happen overnight.

Image captured from the following YouTube video:
The Sound of dial-up Internet - https://www.youtube.com/watch?v=gsNaR6FRuO0

My earliest memories of networked computers are awash with the sounds of dial up modems. Every time I heard that sound I knew that it meant my computer was going to be connected to something bigger and something better. I'd be able to tap into information that I didn't have when my computer wasn't 'connected'. It was no longer just me sitting and working on my computer. I had access to something bigger and something better. It certainly wasn't the internet as we know it today, but it was an opportunity to exchange ideas and information with other people in other places.

It always seemed magical to me that I could connect to these virtual spaces where people were connecting and sharing with each other. Before the rise in popularity of the 'world wide web' (www),

that dialup modem sound meant that I'd soon have access to discussion forums, message boards and IRC chat rooms where I could connect with other people in other places. I could ask questions, seek answers or receive feedback from complete strangers through the magic of the Internet. This flow of information went both ways as I would often respond to the questions of others or provide feedback and support as requested. I was quickly discovering what it meant to be a networked learner as I embraced this idea of connecting and sharing with different people in different places.

Then the world wide web came to define the Internet as we know it today. Thanks to Tim Berners-Lee's development of Hyper Text Markup Language (HTML) in 1989, we suddenly had the ability to link together pages of content so that we could share more kinds of information in more meaningful ways. While the earliest HTML pages that were built were almost entirely text-based, the ability to hyperlink pages to other pages has provided us with entirely new possibilities. These simple web pages became websites where the content could be organized and accessed in a variety of ways. Layout and organization of content became more and more important as reading was no longer as linear as it had always been. As websites became more commonplace, elements of design thinking began to dictate my thinking about how and why I created and shared digital content.

Image captured from the following TED video:
The Next Web - http://www.ted.com/talks/tim_berners_lee_on_the_next_web

Websites began to pop up around any topic imaginable and they also began to support more and more types of content. In the mid 1990's, the 'web' evolved from a text-based platform to a multimedia platform that was rich with visuals, audio and video.

Of course, as I visited more and more of the websites that were popping up in the mid 1990's, I had to figure out how I could jump on this bandwagon and begin developing my own websites. I taught myself the basic elements of programming in HTML so that I could create and share basic websites. To hone my skills, I created one website after another to share the things that were important to me. At that time in my life, I was on the cusp of adulthood so most of the websites that I developed were typically related to either music or travel as these were the things that were most important to me. But I saw the potential that existed by creating and sharing websites. The Internet provided me (and thousands of others) with a virtual space where I could connect and share content with anyone who had the ability to access it.

By the turn of the century, the Internet had become commonplace as more and more people were turning to the world wide web to access ideas and information. But publishing content online was still a skill that required some working knowledge of HTML coding. As a result, only a select few Internet users were creating and publishing these websites. My interest in connecting and sharing digital content on the Internet helped me to stay on the leading edge of technology adoption and it forced me to always consider the role it played in my life and the lives of others around me.

I began my teaching career as a Grade 4 classroom teacher in 2001. I taught at Stevenson School in St. James-Assiniboia for a number of years. In addition to my Grade 4 teaching responsibilities, I also taught various subjects to students at other grade levels. One of the things that set me aside from my colleagues was the way that I embraced the use of technology in the classroom to support student learning. My passion for technology was clearly portrayed in the ways that I relied on technology as a teaching and learning tool. Rather than visiting the computer lab with my class once a cycle to practice spelling or math facts using software like Reader Rabbit or Math Blaster, I would regularly bring the technology directly into the classroom to support my instruction. The school projector lived on a cart in my classroom so I could pull up a website to share with my students about any given topic. When we did visit the computer lab (on a very regular basis), my students were encouraged to create content to show what they knew. Whether creating digital dioramas in Paint or preparing slideshows using Hyperstudio, the projects that I assigned my students often required them to create and share digital artifacts.

As a classroom teacher, I always spent a bit of time at the beginning of each year teaching my students basic skills such as file management and organization. It never ceased to amaze me that the technology levelled the playing field for my students. I clearly remember one lesson within my first couple of years teaching when I showed my students how to create and rename a folder. As I circulated through the computer lab to ensure all students were on track, I stopped to check in with one of my autistic students to offer support and was shocked by what I discovered. In the time it took most students to create and rename one folder, this student had created a folder called 'Animal Encyclopedia' and inside this folder was a set of nested folders named 'A-J', 'K-S' & 'T-Z'. Each of these folders already contained at least a couple of animal folders such as 'Alligators', 'Kangaroos' & 'Zebras'. While this student struggled with communicating his ideas clearly using pencil and paper, the technology allowed him to effectively demonstrate his understanding and other students would often turn to him for assistance or troubleshooting.

Many of my colleagues at Stevenson School took notice of the creative ways my students were utilizing technology and asked if I could find ways to support the infusion of technology in their classrooms. I welcomed every opportunity to collaborate with other teachers and this provided me with the opportunity to work with our staff and students from Kindergarten through Grade 5. This support took on many different forms based on the needs and interests of my colleagues. Over the years, I gave up many periods of prep time to model a lesson or co-teach in another classroom. But my favourite method of supporting my colleagues was to have my students buddy up with both younger and older classes to share their learning. Watching students teach other students without any support from the teachers in the room is a very liberating experience.

My administrator quickly took notice of the ways that I supported staff and students throughout the school and she found some creative ways to nurture my collaborative efforts. I was given a little flexibility within my timetable to allow for a more systematic approach to meeting the needs of the staff within the school. By granting me the opportunity to more formally connect with my colleagues, she allowed me to adequately plan and prepare for these teachable moments and the impact this had on all of our students was profound.

When I reflect on the time that I spent teaching students at Stevenson School, there are a few projects that spring to mind as exemplars of our school-wide approach toward the infusion of technology across all curricular areas.

My classroom was awarded a $300 grant from Grassroots Manitoba to build a website that highlighted various aspects of our province as Manitoba celebrated it's 133rd birthday on May 12th, 2003. This grant sparked a large inquiry project that saw my students researching Manitoba's history, famous Manitobans and many of the towns and cities throughout the province. My students went way beyond the outcomes outlined within the curriculum and the website that they created provided them with the opportunity to share their learning with an authentic audience.

Students in my class began to realize that they had the ability to become change agents by using their voice to make a difference. When our school division first began touting the benefits of sustainability, my students wanted to produce a video that could highlight the importance of conserving water and electricity. We entered a video contest and came in second place with their short video entitled 'Throwing It All Away'. This video was entirely student driven as they were responsible for the planning & storyboarding, the filming and the editing of the video clips.

Image sourced from the following video:
Throwing It All Away – http://tinyurl.com/throwingitallaway

The more opportunities I provided my students to produce videos, the more I realized that this medium could be a great way to encourage my students to connect and share with each other. I began introducing my students to various genres of video production and found that stop motion animation was a very compelling format for helping my students bring their ideas to life in creative ways.

The first year I used stop motion animation (or claymation) with my students, I developed a project that focussed on character development. While the project incorporated technology, the focus of this project was all about the writing. My students each created their own unique character by drawing it and describing it. Their characters came to life by drawing them repeatedly and I was intrigued by how their characters morphed and changed the more the students drew them and wrote about them. Students began to write stories that incorporated other student's characters. Eventually, we got out the plasticine and they breathed new life into their characters by creating 3D versions of the characters they worked so hard to develop.

After all of this foundational work had been done, we finally moved on to the technology and students worked together in small groups to film short claymation clips that truly brought their characters and stories to life. While students worked in small groups to film their claymation clips, everyone had a role to play. Some students preferred to take the pictures while others were more intrigued by the idea of moving the characters within the frame. I found myself wandering from group to group looking for ways to support my students and, for the very first time in my classroom, I realized that none of them needed my assistance. This was a defining moment for me, as I had never realized the benefits of having my students collaborate quite like I did in this instant. I will never forget the way my students supported each other through every aspect of this project. Better yet, all of the short video clips that my students created were collected and shared so that each student could mash up the video clips to produce their own videos and tell their own stories. A few exemplars of their work can be seen in the following video. Pay particular attention to their creative approach to problem solving as you watch these few short clips.

Image captured from the following YouTube video:
Claymation in the Classroom - https://www.youtube.com/watch?v=-J3jmXKhAMs

I always took for granted that the way my students were being encouraged to use technology to show what they know was similar to what was happening in other classrooms and other schools. I knew that the work I did with teachers and students at Stevenson School had raised the bar and I assumed that bar was being similarly raised at each of the schools in our division. But each time I had the opportunity to connect with grade level teachers from throughout St. James-Assiniboia, I was struck by the fact that there weren't many teachers providing their students with similar opportunities. Sure, there were exciting things happening with technology in pockets within all of our schools but there certainly weren't a lot of common elements.

When the Literacy with ICT continuum was first being implemented throughout Manitoba, I was encouraged by the idea that ALL teachers were going to be responsible for infusing technology into the teaching and learning in their classrooms. I was energized by the fact that teachers everywhere would be connecting and sharing all of the incredible ways their students were leveraging technology. Literacy with ICT served as an excellent means of raising the profile of technology in our classrooms and schools

at the provincial level. It helped me find my tribe by showing me that there were, indeed, incredible teachers doing amazing things around my division and throughout the province. This opened up a whole new world of connecting and sharing for me by marrying my love of technology with my love of teaching. I realized I had to be deliberate in my efforts to connect and share ideas and information with other educators.

I was struck by an idea that caused me to sit bolt upright in bed late one night just over a decade ago. It occurred to me that I had a vision for supporting the infusion of technology across our school division and this idea needed to see the light of day. In the middle of the night, I hastily jotted down a number of bullet points outlining my plan and even had the opportunity to pitch the idea to our divisional technology administrator over lunch in my classroom a couple of weeks later. Essentially, I wanted to start cross-pollinating. I wanted to take the best ideas from teachers at each school and share them with teachers in all of our other schools. I knew that every school in our division would benefit if we could highlight and share these ideas, projects, lessons and activities in more transparent ways. As much as I knew that teachers can't just run around creating their own jobs, it was an idea that I could not put to rest so I had to get it off my chest.

Several months later, over lunch in the staffroom, a colleague turned to me and said, "Hey! Did you see that new job posting? It sounds like your dream job!".

Sure enough, it was (and is) my dream job. The job description that was posted matched my bullet list verbatim and I was amazed that this little idea of mine was going to become a reality for someone. I applied for the position and, against all odds, was fortunate enough to land the job. While it has morphed into many different roles and responsibilities over the last nine years, in this capacity I've had the opportunity to connect and share with teachers throughout St. James-Assiniboia School Division around the infusion of technology. This position has also led to many opportunities for me to connect and share with educators across the province and around the world.

I've spent much of the last decade in a role that celebrates the need for connecting and sharing. Over the course of the last ten years, the pervasive role of technology in society has had a radical impact on the way we live and the way we learn. The impact this has had on our schools has been profound. We constantly feel the need to reinvent the way we teach and the things we teach. Our children are growing up in a world where everything is just a couple of clicks away. Our students think differently and, as a result, we need to teach differently in this day and age. I've made it my mandate to encourage all of the teachers I work with to be more deliberate about connecting and sharing. As educators, the more transparent we can be about sharing our ideas and interests, the more difference we can make.

We live in a media rich society and everybody has the ability to share anything. Even our youngest students are capable of publishing websites and producing videos. The digital (r)evolution has led to the prolific spread of ideas and information and publishing content on the web no longer requires a great deal of skill or knowledge of programming languages. If you can point and click, you can create web content. The implication this has for teachers and students is astounding as opportunities abound for creating and sharing authentic digital artifacts with an authentic audience well beyond the confines of our own classrooms and schools.

The increasingly social nature of the Internet can play a major role in leveraging technology to bolster teaching and learning. Surprisingly enough, very few Canadian teachers are currently tapping into the potential that social media has to turn our classroom walls into windows.

Image captured from the following website:
Mediasmarts: Connected To Learn - http://tinyurl.com/connectedtolearn

The image above is from a recently published (2016) infographic that highlights some of the findings from Mediasmarts' ongoing research about 'Young Canadians in a Wired World'. If you have not yet seen the data that's being collected by Mediasmarts related to technology use by young Canadians, you need to take a look at the various infographics that they've created and shared. This current Canadian research can, and should, be used to inform technology instruction in our classrooms and schools. I was shocked by the fact that only 13% of teachers utilize social media in the classroom. I know for a fact that in my school division the percentage is at least twice as high. I can't help but think that some of this increase can be attributed the the work that I do within my school division asserting the need for connecting and sharing.

The world has become a much smaller place now that multiple social media platforms grant us the ability to communicate & collaborate with others in real time, regardless of where they are in the world. We now have endless opportunities to expand our learning spaces well beyond our physical classrooms. By leveraging digital learning spaces, we can go on field trips without leaving the classroom or bring in experts from around the globe to inspire our students.

The following example perfectly illustrates that there are no limits to our ability to connect & share with experts in the field. Back in 2009, I was asked to participate in a very unique conference call. About a dozen high school students from John Taylor Collegiate were granted the opportunity to interview Dr. Robert Thirsk (an alumni of the school) while he was aboard the International Space Station! At the time, he'd been aboard the ISS longer than any other Canadian astronaut and these students had less than ten minutes to ask questions questions of Dr. Thirsk as the ISS appeared then quickly vanished over our slice of the world.

These students were initially amazed by simply joining into the conference call along with ISS personnel in Hawaii, Florida and Belgium. The initial shock and wonder came from the fact that it was late afternoon in Brussels, early morning in Winnipeg and the middle of the night before in Honolulu. These folks explained to the students that the space station circles the globe approximately 16 times a day and that we could only talk to Dr. Thirsk from the time the ISS crested over the horizon in Hawaii until it dropped below the horizon in Belgium. The moment that the students first heard Dr. Thirsk's voice through the speaker was magical and I have no doubt that this experience is one that these students will never forget. The following link contains a short excerpt of the interview.

Image captured from the following video:
Outta This World - http://tinyurl.com/outtathisworldvideo

More and more of our students are forging their own identities through the social networks that they build and maintain. While a great deal of this takes place outside of school, I'm pleased to see that more and more teachers are creating opportunities to utilize social media in their classrooms. Through social media platforms such as Instagram, Twitter and classroom blogs, their students have many opportunities to connect and share their learning with teachers and students in other classrooms and schools.

Becoming a networked teacher and/or learner requires time and effort but this investment will pay great dividends over time. While some of the benefits are gained immediately, others will increase over time. But building a professional learning network isn't just about developing and nurturing online connections. Human relationships play a major role in fostering connections.

Twitter is great if you're looking to connect with other educators from around the globe but you must also capitalize on the interactions that occur during the face to face professional learning opportunities you attend if you want to maximize your ability to connect and share. Make professional learning a priority and you'll be amazed by the opportunities that begin to present themselves to you. Better yet, get involved with planning and facilitating opportunities for professional learning! My long term involvement with ManACE (Manitoba Association for Computing Educators, www.manace.ca) and other provincial organizations has enabled me to firmly establish a network that includes many creative and innovative educators that I'm proud to call colleagues and friends.

The more you get 'connected', the more people begin to take notice of the work that you do and the ideas that you share. Through my online and offline interactions with other educators around the globe, I've been presented with many incredible learning experiences as a result of the things I've both created and shared. Back in 2011 I had the opportunity to attend 'Unplugd', a three-day retreat that was held on the edge of Algonquin Park in Ontario. Thirty-seven of Canada's most connected educators left their wired worlds behind and gathered to write an eBook entitled "Why _____ Matters". Each participant filled the blank with the one idea that they felt mattered most to ensure that Canadian classrooms and schools are meeting the diverse needs of our students. Adding the human element to these existing virtual relationships made for a transformative learning experience for everyone in attendance.

Image captured from the following eBook:
#unplugd11: Why _____ Matters - http://tinyurl.com/unplugd11ebook

One of my most transformative experiences connecting and sharing occurred nearly five years ago when I had the opportunity to visit Churchill, Manitoba in the fall of 2011 to witness the annual polar bear migration. Thanks to a collaboration between Edmodo and Polar Bears International, I had the incredible opportunity to facilitate a series of webcasts that were streamed live into classrooms and schools around the world. Each day, over 10,000 teachers and students participated in these webcasts and we fielded many questions about polar bears and their habitat. Working alongside an incredible team of scientists from around North America was an experience that I'll cherish forever. The learning and the sharing that took place while I was in Churchill helped me to realize that even being in an incredibly remote environment, on the shores of Hudson Bay, connecting and sharing is still possible. When there's a will, there's a way.

Given the unique opportunity that I was presented with, I knew I couldn't be selfish with the knowledge that I'd be acquiring while in Churchill. Just before I embarked on this adventure, I set up a blog to share my pictures and my stories so that this could truly be a shared experience. Each day, I documented the things that I was seeing and hearing while aboard Buggy One. As I shared my learning in this capacity, I was delighted to see teachers and students leaving comments, sharing their reflections and asking their own questions. Connecting and sharing shaped this experience for me and it's armed me with anecdotes and images that I've been able to share with teachers and students repeatedly over the last five years.

Image captured from the following website:
Chilling with Nanuq – http://chillingwithnanuq.com

I am very fortunate to be able to relive this experience time and time again by visiting classrooms and schools to share my thoughts and ideas around sustainability and the need to be a strong voice for our polar bears. I encourage students to become advocates for our polar bears by taking action and sharing their ideas around ways their friends and families can minimize global climate change. I've had the opportunity to visit many Manitoba classrooms in person but technology has also enabled me to Skype into classrooms as far away as Singapore and Sydney, Australia! I'd like to think that at least some of the students and teachers I've connected and shared with have been compelled to take action and make a difference.

As educators, we each bring a unique perspective to the students we teach. Our individual talents and interests set us apart from all of the other educators in the field and we must find ways to reveal these gifts and abilities with our students and with our colleagues. Connecting and sharing our ideas, our creations and our beliefs is the key to unlocking the full potential that exists within all of our classrooms and schools around Manitoba and throughout the world.

Andy McKiel is employed by the St. James-Assiniboia School Division, where he works as a Curriculum Coordinator. Andy also serves on several Boards, committees and conference planning committees across the province of Manitoba, including ManACE (Manitoba Association for Computing Educators), MAETL (Manitoba Association of Education Technology Leaders) and Riding The Wave. In his pursuit to provide 'just-in-time' professional learning opportunities for learners of all ages and stages, he's been exploring the wide variety of ways that technology can be leveraged more effectively to improve the teaching and learning at all levels.

Chapter 10 - Song Mosaics: Using Your Own Talent as a Vehicle for Teaching and Learning

Ryan Miller

Nearly defeated, I almost quit teaching by winter break of my first year. Coming out of university, I felt optimistic and idealistic in my quest to be an effective teacher, but I found out very quickly how overwhelming and all-encompassing this life could be. Working with at-risk students with needs I felt were beyond my scope at the time, I seriously considered my options and barely survived the experience.

In my second year, however, I attended a Character Education conference in Ottawa that I feel saved my career. During the opening keynote presentation, the presenter came up and delivered a hilarious comedy routine while covering all the major areas and pillars of character education. He captivated the audience with laughter while delivering the educational content of his presentation topic. At the end of his presentation, he left us with one message and said – "If you only remember one thing from my presentation today, it is that teachers need to embrace their own talents and interests as a vehicle for teaching and learning". In that moment, a lightbulb went on for me that has carried with me throughout my career.

I am currently in my twelfth year as an educator. I spent four years as a classroom teacher, three years as a guidance counsellor, four years as a vice principal and am currently in my first year as a principal. In addition to being an educator, I am also a musician and songwriter and have played in several bands in the local circuit and in festivals across Canada. Music has always been my passion and I knew after seeing the presenter in Ottawa that I had to embrace my passion for music and songwriting as a way to engage and motivate student learning. I also knew that embracing technology would play a major role in this process.

Song Mosaics

I started off simple. Instead of creating word walls and KWL charts for new units, I created catchy melodies covering all the major keywords and content for each unit and while the students were singing along, they were inadvertently learning and remembering all of the key terms. To get their attention, I would start playing guitar or create rhythms that they would replicate and call back. When I started this approach, it was obvious that the music was captivating their interest and was hooking them into the fabric of the classroom. It was not only the students though, I was also more engaged and excited to come to school each day. It's funny, I haven't actually taught in a classroom for over eight years now, but when I run into ex-students of mine, they still remind me of the various songs we came up with together – "Mr. Miller, remember the Bacteria Rap?"

When I moved into the guidance role, I wanted to provide unique learning experiences for students by having them compose original collaborative song compositions with lyrical content based on the student ideas that were being generated in our class discussions on topics such as community, social justice and Remembrance Day. For my own songwriting ideas and demos, I use a Mac program called GarageBand which is basically a portable music studio and loops program which allows you to generate patterns and arrangements using song loops as well as live instrument and vocal recording. Before I was

able to introduce my idea for our song composition project, I had to introduce the platform and capabilities of the GarageBand application. As soon as I introduced it, the students embraced the technology and were teaching me new details and shortcuts for using the program. The GarageBand application was perfect for initiating these types of song projects, but in order to produce a professional quality song, I knew we would have to access a studio engineer and sound booth as well. Since this endeavor required capital, I had to access grants to help fund our projects. As a requirement for the grant proposals, I had to name and define our projects as:

> Song Mosaic – A collection of voices and ideas on a specific topic to a specific melody. Or, as my dad calls them, my "We Are the World" songs.

One of the first song projects we developed together was for Remembrance Day. As an activity for learning, I had my students research their own family history and involvement with war and conflict. Students began bringing in rich discussion, stories, pictures and artifacts from family members, and they began to understand the burden and sacrifice of war. This project spread to include staff members researching and sharing their own family histories and artifacts as well. We recorded our student's voices from their own perspectives and created a melody and message to share. To accompany our original song, we decided to go on a field trip to local monuments and memorial sites to take pictures for a visual representation of our project. Our school choir became involved and sang the chorus to our song and a video was produced in iMovie and uploaded to YouTube to share our learning with the world. We presented our project for the first time at our Remembrance Day school assembly and invited local media. Our project was promoted and well-received, and we even received an email from Prime Minister Stephen Harper commending our work. Below is the YouTube link to our project called - Soldier: https://www.youtube.com/watch?v=x6RVHHWnG3k

When I became vice principal in a different elementary school, I wanted to create a whole-school project to develop community and spirit among our students and staff. I met with our music teacher and began planning what would become an original school theme song including dance choreography and official video. A melody was developed and the lyrical content was developed and generated by students in each of our kindergarten to grade 5 classrooms. Auditions were held for students to sing specific sections of our song and the choir learned and sang the chorus sections. Two of our teachers on staff were trained dancers and we utilized their talents and capabilities to create dance choreography that they taught to all staff and students in the school. A video was also produced and the song became a weekly staple at assemblies and community events. Below is the YouTube link to our project called – Reach for the Stars: https://www.youtube.com/watch?v=mdBv-VQPnX4

In our school division, we host a Youth Forum every year where a group of students from each of our 26 schools come together to discuss the various local and global causes that are supported throughout the year. This is a time when our schools collaborate and share ideas to make a difference in the world. Inspired by this, I came up with an idea to connect all of our 15 elementary schools by creating an original song celebrating the diversity and collaborative nature of our school communities. I began by contacting the principals of each school and asked that a group of students develop a phrase or slogan that best represents their unique school. Once the phrases were collected, we made the trip to each school to film and record the student slogans. We then created a melody and compiled them into a song structure and video. Our school choir once again learned and contributed the chorus sections and a video was produced

to celebrate our schools. The song and video was presented for the first time at the Youth Forum wrap up and the students who were involved sang along. Below is the YouTube link to our project called – Better Together: https://www.youtube.com/watch?v=iEGNG8suGzc

By embracing my own passion for music and songwriting, I have motivated myself to provide authentic learning experiences for my students. These projects empower students to express their ideas and apply their learning in unique and memorable ways. As a leader, I try to encourage my staff and students to utilize their passions as well. One example is a teacher who is a dancer who mentioned that she would love to teach her students how to tap dance. I helped her draw up a proposal for an at-risk grant and once it was approved, we purchased a class set of tap shoes. Throughout the year, she choreographed routines for school and community events and she produced a video of an original stomp and tap routine. By embracing her passion for dance, her program provided an opportunity that these students would never have ever experienced otherwise. Below is the link to our project called – Tapping Our Potential: https://www.youtube.com/watch?v=rJdlI36zT8E&nohtml5=False

Role of Technology

The role technology played in my development as a teacher cannot be overstated. Technology allowed me to pursue ambitious projects and was instrumental in providing students with direct access to their learning and an outlet to share their learning with the world.

In our school division, we are lucky to have access to many platforms and devices. When I first started using music as the vehicle for learning and teaching, I introduced my students to music applications and programs that use patterns and loops. The purpose was to have students explore music as a form of expression, and students who previously did not see themselves as musicians were now creating original arrangements and soundscapes. This created excitement and confidence, and my students all began considering themselves budding artists as they were fully engaged in the process of creating music.

When we evolved into the process of creating Song Mosaic projects, the students began taking on roles in the overall production by becoming sound technicians, photographers, editors, and videographers. Students who were not interested in recording their voices or playing instruments, still played a vital role in setting up microphones, setting up cameras and then compiling and editing the pictures and video into a visual representation to accompany our original songs. Students were responsible for their contribution to our projects and they became not only literate, but expert in the programs and technological tools and programs.

When our projects are near completion, the excitement builds to share our learning with the world. Technology and applications like YouTube allow our students to promote and share their learning to a wide audience outside of the walls of our school. Daily anticipation to see the views and comments about their learning experiences keep students motivated and it provides a purpose and audience for their learning.

The most vital aspect of using technology in my experience as a teacher and learner is that it is an effective means to an end. By understanding the purpose of each of our projects, my students were able to utilize technology, applications, and programs as tools to accomplish the goals of our learning. We did not learn programs and applications just to learn them, we utilized them as tools to achieve our objectives. If during one of our projects a student found a more effective application to edit or filter a video, for example, we would adapt our programming to better suit the overall project. This resulted in a fluid process of learning technology to suit our needs and helped our students understand the true definition of

technology as the collection of techniques, skills, methods, processes and applications in the accomplishment of effective objective.

Conclusion

As stated earlier, I am currently in my first year as a principal in an alternative high school. I continue to embrace technology and to utilize music and songwriting as a creative outlet for teaching and learning. I have a dream to develop a functional sound booth and studio within our walls. We are currently working on an original song for our upcoming graduation ceremony and the lyrical content was developed by our students – student voice in action. My students are once again immersed in technology and evolving into roles to support our project. Embracing my passion for music made me an effective teacher, and if you remember only one thing from reading my article, it is that teachers need to utilize technological tools and to embrace their own talents and interests as a vehicle for teaching and learning.

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Chapter 11 - Elementary School Robotics at Meadows School

Melissa Volekaert Lander

The world is changing immeasurably and continually with regards to technology. As educators, we must ensure that we infuse opportunities to learn and to engage with this ever-changing technology. Our mission is to provide tools and supports to ensure our students can become confident, creative, and adaptive individuals with the 21st Century Skills required to be successful in their future. This of course, is incredibly challenging, when much of the technology students will interact with has not even yet been created. So we are left to guess, at best, what attitudes and skills our students will need to be successful in their future. It is likely that we as educators, do not know what our students will need to know in order to be successful.

If school is a microcosm of the greater world, it is essential that we include technology as its use "explodes" in the daily life of most people. We should strive to create individuals with flexible thinking who are passionate about what they do, and continue to advance these fields because they have the skills and desire to do so. This means that our students must also be engaged in their schooling if they are to develop these remarkable skills.

So the world and technology are quickly changing, and we do not know what our students need to know to be successful in the future. However, what we do know, is that they must develop a broad range of skills, termed "21st Century skills," they include a vast number of abilities such as creativity, flexibility, and teamwork. We also know that it is essential that our students are engaged to develop the drive and passion to continue to develop into successful adults and continue to advance technology. With this ideology and these goals in mind, we set out to establish a robotics program at Meadows.

SECRET skills (see Appendix B) are currently being used in The Brandon School Division in our cluster schools to teach 21st Century Skills. They are based on the work of Dan Buckley.

The goals of the program were to engage our students to develop a passion for STEM (Science, Technology, Engineering and Math), build 21st Century Skills using the SECRET Skills (Self-Management, Effective Participation, Creativity, Reflective Learning, Independent Inquiry, and Teamwork) in order to equip them to effectively deal with an ever-changing world. We also wanted to encourage our students to build the capacity to become experts, and share their learning and engage other students by passing on what they have learned.

Before the program could begin, the challenge became selecting the materials or robots that I felt I could work with, and that my students could be successful with. As our program evolved, this became much less important. The key here is that I do not have a background in robotics, however, I do not need to know how to build a robot to allow my students the opportunity to learn robotics.

After researching different options for our robotics program, I elected to use Lego Mindstorms EV3 Educational for a variety of reasons, including:

- It was a hands-on/ minds-on approach
- It had enduring and engaging materials to teach STEM that were reusable
- Students could take ownership of the learning process with these materials; it was a personalized learning opportunity! (In the Brandon School Division, it is part of our strategic plan to provide personalized learning opportunities for our students.)

- Students would actively develop problem solving, creativity and collaborative skills. (21st Century Skills). It fit well with the framework for 21st Century Skills we use at Meadows called SECRET Skills (Self-Management, Effective Participation, Creativity, Reflective Thinking, Enquiry and Teamwork)
- The students become CREATORS of technology, not just consumers

I did not know how to use the Lego Mindstorms EV3 robotics kits, and I made a conscious decision not to learn how they worked before we began learning. (This was very difficult for me!) I was going to be teaching a topic I knew nothing about. This is very difficult to accept as a teacher, but in my role of Personalized Learning Mentor teacher, I am always telling people that you do not need to know what your students want to learn to let them learn it. So it was time to "walk the talk" as they say. I was going to let my students learn something I knew very little about.

This requires a major shift in thinking. We must take risks as educators. We do not need to know what our students want to learn in order to allow them the opportunity to learn it! Our students will want to know so many things we just simply don't know. Should we not allow them to learn it because we don't know it? Should we limit their learning based on our own personal limitations? Absolutely not. How would that be fair or help prepare them for their futures in any way?

Engaged students are successful students so we must allow them to explore their interests and develop skills in areas we have no background knowledge in, or struggle with ourselves. You do not need to be the "keeper of the knowledge" or the expert that disseminates the information their students need to know. This requires a large shift in the mindset of the teacher, as well as the role they play in their students' learning. There is a great power shift which many may feel uneasy about. But trust me, it is liberating and will be incredibly educational for all stakeholders to allow moments of releasing control in your day. The benefits and rewards will highly outweigh the risks you will need to take.

That is not to say the teacher steps back entirely; there is a very necessary place for "front loading"; direct and explicit instruction. However, in a situation like this, where you are not the expert, it allows you the chance to shift into a facilitator role (see Appendix A). Your job is no longer to know all the answers. Your job is now to ask the right questions, to point your students in the right direction so they can find an answer/solution on their own, to encourage them, and to keep them on track. In this role you want to capitalize on the strengths of your group members. For example, if one of your students knows how to double load a gear or axle, then you don't need to. That student can now be responsible for passing along that information. If another student knows how to program the robot, they have now became the expert, or the resource for other students. THEY have become the expert. THEY have become the "keeper of the knowledge". Your role is now to make sure they share that skill or knowledge and others have access to them, and those skills are passed on to others as they need them. You become a member of the team. You are learning together, and you, along with your students, are all in this together. You are a valuable member of the team and have a role to play, just like every other student.

With this change in role, comes a shift in the power structure of your classroom. For this type of learning situation to work, you need to be willing to give up some responsibility and control. You need to allow your students to have that power if you want them to be successful in learning independently. The students become the keepers of knowledge, the experts. You do not need to know how to program the robot to see edges and stop; one of your students knows. It is ok that you don't know. It is. Really!

In fact, students holding more power comes with some absolutely amazing side effects. Students that feel they have more control and power are also more responsible. This is their learning. They are in charge. They are also much more confident in their abilities. They may not know something YET, but they know they can and will learn it. They also become leaders and produce the kind of teamwork that I have yet to see in any other type of learning situation.

My students were ultimately competing with one another to build a robot to fight and win against the other robots. I expected a sharp competitive edge in the classroom atmosphere. However, what resulted was the exact opposite. When students needed materials that were not in their kit, others not only willingly shared their resources, they would stop what they were doing and help them find it (this happened every single day we built). Once one student mastered a skill (E.g., how to program a feature) they made themselves readily available to show other students how to do it as soon as they got to that stage as well. No one complained about having to stop their work to help others. No one was annoyed they had to help. They did it, and they did it with impressive enthusiasm and skill. Something was different in this learning situation. Something was incredibly different, and wonderful.

What becomes even more impressive about this collaboration is the type of students I was working with. I had a wide variety of abilities in the group. Many were very intelligent, some did well at school, others struggled and were low achievers, and some were identified as behaviour issues in their classroom. I can guarantee you that you would not have been able to identify which type of student was which if you were to watch these students in action. They were engaged. They were on task. They were learners. They were teachers. They were experts. They were in charge of themselves, and they were incredibly proud of what they had made.

These students now have the capacity to teach others, and have been doing just that. They provided a workshop for our Grade 3/4 students to teach them the basics of how to start building simple robots. They have offered Lunch and Learn sessions where students can come and try robotics out and see if they are interested in learning more. When we have "Technology Rooms" during student dances, these students make themselves available to teach others or provide support for those that are struggling with a project. They are also available to travel to other local schools to help them get started as well. Incidentally, currently I have done this with another program created with a similar approach for video game design using "Kodu" as a platform. Now this group of students will be available to continue this program as students teaching students within the realm of robotics!

By taking the risk I did, and allowing these students to learn something I did not know, and allowing them to have power, control and responsibility in the classroom, the students that were not engaged or achieving their full potential in a traditional classroom, were achieving. The students with behaviour issues displayed no problematic behaviours, and the achievers also achieved. This was by far the best risk I could have taken as an educator.

I discussed what we had been doing in our classes with my students, and told them that I had presented about them and our program to other educators. During this discussion, I asked them what they felt was most valuable, what they liked about how we learned, and what they think could be done differently. One student, lightheartedly shared "you really didn't teach us anything!" and laughed. But then something beautiful happened. He continued, and said, "but what you did is showed us how to learn it ourselves. Actually that is really cool!". I jumped up and yelled, "EXACTLY! I did not need to know something for you to learn it!"

In fact, I probably still can't build a robot on my own. My students can build and program circles around me. Instead of feeling less of a teacher for that, I feel proud of them. Honestly, I also feel proud of me; because if I hadn't have taken that risk and allowed them to learn something I was uncomfortable with, they would have never learned how to build the robots, or had an opportunity to develop their 21st Century Skills. The students who were not engaged or achieving their full potential in a traditional classroom model are now leaders, and they are demonstrating their deep learning by passing it on to others. The have had the opportunity to know what success feels like. They were now experts. The students with the behaviour issues wouldn't have had the chance to have others see past that, and put other skills to work and become valuable team members to do something that was meaningful to them. If my goal was to engage students and create a passion for STEM, along with developing creativity, flexibility and the 21st Century SECRET skills; I had no doubt in my mind those goals were clearly met. It turned out that the information or skills I didn't know as a teacher, was actually more powerful than what I did know.

Teachers may be resistant to this shift in power in their classrooms, and taking a risk to teach something they know very little about. This is not something that teachers need to do every day to see these types of improvements in their students. The group I worked with met approximately eight sessions over two months. It doesn't have to be a huge risk to reap huge rewards for your students. As Rick Godwin said, "one reason people resist change is that they focus on what they have to give up, rather than what they have to gain." My hope is that educators can focus on what they will gain, and more importantly what their students will gain if they can occasionally push themselves out of their traditional role and allow their students to learn what is unknown to them.

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Appendix A - How We Learned

- We used a flexible learning environment where students selected where to work (desks, tables, the ground, etc.), as well as who they wanted to work with, and what they wanted to build
- Trial and error were extremely important
- Failure was encouraged
- The Process – build; test; fail; rebuild; test; fail etc,
- Mini Lessons were used to teach some skills, and were often led by students
- Student led and supported
- Team troubleshooting
- Learning challenges were used
- Student-led problem solving

Appendix B - 21st Century or SECRET Skills

21st Century Skill or SECRET Skill	Sub-skills	How the Skill was Utilized
Self-Management	Manage emotions Manage risk Be organized Go for it and finish it	Manage frustration Take risks Manage robotic kits Organize building materials Go for it and finish their projects
Effective Participation	Persuade others Identify issues Find solutions Get involved	Persuade others to build their work/compromise Identify issues with robots Find solutions Be involved and hands-on to fix issues
Creativity	Imagine Make links or connections Take creative risks Question assumptions	Imagine their product Make links to their learning Take risks when building and programming Ask questions "Think outside the box"
Reflective Thinking	Set challenges Plan-do-review Invite feedback Share learning	Set goals and challenges for thier robots Plan-do-review (build, test, fail, fix) Invite feedback from teacher and peers Share their learning with the group and teach a group of younger students (Grade ¾ about what they learned)
Enquiry	Explore a question Evaluate evidence Remain objective Make conclusions	Explore their process Evaluate or test the effectiveness of their robot

		Remain objective and include others' ideas Reach conclusions and adjust their creations accordingly
Team Work	Be responsible Manage the team Build on team strengths Evaluate the team	Responsible for their building materials Manage themselves and team members Build team strengths by asking for help from students with strengths in building or programming Collaborate and group problem solve cooperatively Assist other groups in troubleshooting Provide continual encouragement

Melissa Volekaert Lander has been teaching students in STEM in the HALEP (High Ability Learners' Program) in the Brandon School Division for the past four years. Prior to that she trained and taught in Ontario for 15 years. During that time Melissa taught a variety of classes, was the Gifted Coordinator, a Director of Curriculum and Head of Lower School at a small private school in Toronto.

Chapter 12 - The Three Heads of Cerberus: a Herculean Saga of Teaching Transformed by Technology

David Nutbean

For a number of teachers, using technology can be a Herculean task. In Greek mythology, Hercules was sent to defeat Cerberus by Eurystheus, who thought it was an impossible task. In most depictions Cerberus is a three-headed dog with a serpent's tail, a mane of snakes and the claws of a lion. Defeating Cerberus was the twelfth labor of Hercules after which he became one of the greatest heros of Greek mythology. It is a complex and fascinating story, much like the story of teaching, with its many challenges, beasts to overcome, long battles with adversity, and triumphs over seemingly impossible tasks. With all the labors during the day, the last one many need to take on is technology. But as we will explore, it is one which can transform teaching into a heroic experience.

As a long time teacher who started teaching BEFORE the birth of the world wide web, many of my students would confess that I must have known Hercules personally and had Cerberus as a pet. Be that as it may, what follows is my story of teaching with technology. In it I will aim to explain the challenges, opportunities, and ultimate~~ly~~ triumph over Cerberus (a reference to old, outdated, and mythological teaching methods) by taking on the three heads of Cerberus, which will represent the three parts of teaching: transmission, assimilation, and assessment. The story is mostly chronological, beginning before Wifi and when paper was the main means of getting information to students. Over time, as technology became available, I found ways to use it in the classroom that both transformed my teaching and student learning and ultimately slayed the mythological beast.

Looking back on my battle with Cerberus there was an equally daunting, less metaphorical monster that I had to conquer. The photocopier is the antagonist in the drama of creating the paperless classroom which was my start in taming the transmission of information and important in defeating the first head of Cerberus. Like the Jabberwock in Alice in the Looking Glass, as I used more technology in my classroom, the *Snicker-Snack* of the monster slowly faded into the past like heroic quests from medieval times. Like the poem itself, it made less sense to use the photocopier "with eyes of flame, came whiffling through the tulgey wood, and burbled as it came!" By converting all my resources to digital form, the burbling photocopier became a mythological thing of the past.

The transmission of information to students is a key component in pedagogy. As a foundation of cognition, information provides forms of knowledge and comprehension that are keys to building higher level thinking. As I started my journey as a teacher, it was obvious that to gain knowledge you must give knowledge and what needed to be known should be provided by the teacher. This transmission process at first meant that I had to provide all the information to the student. This authoritarian approach also brought with it a linearity of process, and this is further reinforced by using a photocopier to create resources for students. By making the same copy for each student, you are forcing students to use the

information you provide as a resource which will also reinforce a form a linearity as you go through the entire instructional process.

At first I was OK with that. Giving them the information I wanted them to see seemed to make sense. I was not too terribly experienced in my subject matter and it certainly makes teaching a lot easier. It didn't take long to realize, however, that this approach was BORING! Both for myself and my students, who each had a computer that they were working at. The sheer linearity of the process quickly became annoying as the diversity of students and what they could accomplish seemed epic compared to the frailty of linear pedagogy. The better way was with the use of technology.

Paper itself was not the enemy I set out to conquer, but it was an objective manifestation of what could be eliminated from the process while bringing forward new pedagogical approaches. Many years before SAMR would become a common technology integration acronym, I began the process by substituting (the S in SAMR) my resources. Using a scanner was my first approach, taking useful resources that I couldn't quite part with and putting them in electronic form, usually in the form of a PDF. These files would be stored and organized on the school server (and then the divisional server) where myself and students could get access to them. Fairly shortly after having converted many of my resources to digital form I realized, as a revelatory ray from the heavens would reveal, that I also have changed my pedagogy.

SAMR Model

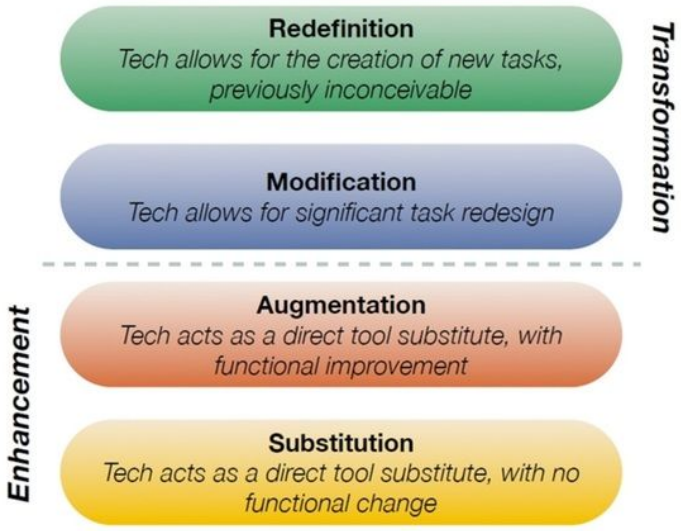

Image the creation of Dr. Ruben Puentedura, Ph.D. http://www.hippasus.com/rrpweblog/
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Changing the resource from having to be copied by myself every time a student needed it, to where students could get access to it whenever they wanted it, made use of the resource in a student-centered way. Having removed the Sisyphean process of copy-provide-repeat, the resource is always available to the student and relieves the burden on the teacher. This means that the student, not the teacher, can get the information any time, also removing the linearity of resource provision. As I began to see the power of this simple change, I began to see this head of Cerberus suffer a serious injury.

At the very least, this change in process allowed tremendous efficiencies in resourcing. First, you only have to make one copy of a paper resource. Once it is created, it is there for the students to use whenever. If a student is gone from class for some reason, the resource is still there. Instead of needing to run off to the photocopier, I would say "go get it off the server." The students would be able to get resources for themselves. If they wanted to use the resources for themselves elsewhere they could put it on a flash drive and take it wherever. At this point in time, cloud storage such as dropbox and Google Drive hadn't been invented yet.

Another possibility arises when you make your resources digital - differentiation. Once in digital form, resources can usually be made into an editable form using OCR software or sometimes directly brought into a word processing application. Now you are no longer stuck with the same assignment for each class or student, you can change your resources as you need to suit the changing needs from year to year or day to day. In other words you can differentiate your resources to better accommodate changes in your pedagogical environment. This is what can be done with your now dynamic digital resources, which was much more difficult with static paper resources. Instead of forcing your classes and students to conform to resources that you cannot change, you can change the resources for the best fit in your courses.

Soon all my resources were digital. Some were borrowed from past work, being scanned and customized as needed. Some were new types of resources that were made available as the internet became more prevalent and powerful. Webpages, YouTube, Google Sites and others became my Classroom 1.0 experience where students could get the information they needed wherever and whenever. When Google introduced Google Apps personal edition, I used this with my students, utilizing Google Sites for my "Homework Page" or online class page. Unwittingly I was well on my way to creating a "blended learning" environment for my classes. Using Google Drive I was able to now upload the digital resources I had previously kept on the server and make them available on the web. No longer was my classroom just in my classroom but also available for all to see and available to students anytime, anywhere and any device. And this is where things change yet again. Because in a world where the information is everywhere, so are the answers - more on that later.

As I put more of my resources online, issues of copyright and privacy became more of an issue. This realization came about as I was trying to to use more and more of my textbook resources and put student work online. The usual (but not necessarily legal) practice of playing loose with copyright law in the classroom because it can't be easily enforced inside a classroom was very annoying at first because how would I ever be able to post my usual resources to the web. Then it hit me that I shouldn't be using my textbook! I should have listened to myself from the past and create custom resources that are more appropriate for my classes, then I can post them as I wish because they're my own resources!

From that revelation forward it became clear the textbook establishment was to be no more in my classroom. Using a combination of custom made resources and other resources created by others (linked to and attributed as needed), as well as a large number of sites specific to my subject matter, and YouTube, there is a resource out there for any subject and topic. Although I may have taken this to the extreme, I would venture to say that there is no reason at this point in time that there would not be more than enough information available for every K-12 curriculum freely on the web. With careful and conscientious selection of online resources, there is no reason for anyone to use a textbook in school. That doesn't mean that curricular implementation structures such as units, sections, topics and objectives are not relevant, they absolutely are; however, the delivery of curricular resources can be made digital

and non-linear. In a Web 2.0 world (at least), the dynamics of technology and the dynamics of learning should be respected by not using static information in a linear delivery medium.

Recently, with the introduction of Google Apps for Education and Google Classroom, the ability to create a blended learning environment with differentiation has become easier than ever. Within the past year or so I have shifted into the Google Classroom environment, which has provided more digital pedagogical opportunities. The tight integration of Google Classroom with Google Drive has meant that providing and sharing resources has become extremely easy. In the past when using Google Apps personal edition, the sharing of resources was done manually, requiring the teacher to set up shares with each student. Under Google Classroom, sharing a resource only requires a teacher to choose a share setting for a resource. If teachers require documents for an assignment, these can be created and shared, depending on the stage of the assignment, so that the assignment is available to the student to edit, then the teacher to mark, and then for the student to review the work. This process occurs as if the document is a single document nearly exactly the same way a paper assignment would be shared back and forth from teacher to student, student to teacher, and back to the student in a paper assignment workflow. For teachers that are looking to transition to digital pedagogy, it is as seamless and technically easy as it gets to transition from paper to digital assignments.

In Google Classroom student involvement is by invitation, membership is controlled by the teacher, and only those in the class are allowed to participate in a class. This provides more control of the environment in a more private setting allowing for a more natural classroom experience. The Classroom environment is an exclusive environment that is not visible to the entire internet, unlike the personal Google Apps environment. This creates a more private environment for classes and because classes are only visible to certain individuals, creates a "walled garden" that becomes an extension of your classroom environment. This allows for more secure and open communication within the class and inclusion of some copyright materials as resources under educational fair use that otherwise would not be allowed in the open web in my previous use of Google Apps personal edition.

For me, Google Classroom has been the "killer app" for my digital pedagogy. It is by no means the only digital classroom platform out there, nor is it the most powerful. The fact that it allows for a classroom to be setup easily and also integrates with other Google Apps such as Docs, Sheets, Slides, Calendar, and many others make it a classroom management and application platform that, is my opinion, not comparable to other environments. As continuous improvements are made based on teacher feedback, Google Classroom should be my platform of choice for years to come. In terms of the transmission phase of instruction, I had defeated the first head of Cerberus, and with Google Classroom and Google Apps for Education I have severed it clean off.

The Three Heads of Cerberus include a second head in our analogy, that of assimilation. Assimilation encompasses the various ways that curricular objectives are reinforced, rehearsed and expressed by students. This includes how facts, ideas, and theories are understood. These are basic skills, knowledge and understanding that is often low under Bloom's Taxonomy but still important for many curricula. As I began my journey with digital pedagogy, this is one area where technology and pedagogy could join to produce engaging experiences for students.

Although high-level thinking skills such as the 4C's (creativity, critical thinking, collaboration, and communications) are regarded as important 21st century skills, most teachers will admit that basic facts have an important part in learning as well. As any driver-training instructor may tell you, knowing the difference between the brake pedal and the accelerator may be a simple objective, it is nonetheless

very important. As foundational to other higher level understanding, knowledge objectives are an important construct to more "worthy" outcomes.

Most teachers would agree that although "drill and kill" and other rote learning techniques are not well received by today's students as engaging learning experiences, there is a need for a form of rehearsal or repetition to learn important facts. As a media teacher it is imperative that student know the interfaces of the applications they are using so they can navigate and control the application and how they will be producing their work. Often students want to jump right into the creative end without knowing what the "pedals" do. Students can easily hit the accelerator and crash their application! One way I have found to scaffold learning through the levels while allowing them to be creative with the applications is with projects and product-based assignments.

A specific illustration of this technique involves Photoshop tools. A number of tool-specific product-based assignments are used to reinforce the names and use of specific tools. For example, to repeat the use of the selection tool, students have to create a brick house out of a few bricks included to them in a provided picture. Students are encouraged to create a house out of these bricks (and other parts such as doors and windows) by making any number of copies and assembling their building. In this way they repeatedly use the tool, reinforcing the name of the tool and its use. Usually such an assignment would include multiple uses of the tools and techniques such as the different types of selection, options for each as well as keyboard shortcuts to complete tasks efficiently. Not only are students learning basic facts about the tools in a repetitious manner (lower level thinking), they are also allowed to use their creativity in creating a product that also demonstrates effective use of the tool (higher level thinking).

As students complete smaller assignments, students have the opportunity to complete larger projects based on their interest. By this point students have demonstrated enough basic skill to create larger projects with less emphasis on specific application tools and more on their creative skill with the tools as a whole. Some projects of choice include "The Rick Mercer Photo Challenge," "Mutant Me (The site linked is no longer updated or maintained)," where students add arms and legs from other creatures to a picture of themselves, and "Super Planet," where students use the creation tools to make a completely imagined version of an alien planet. Each of the named projects would use a number of tools and techniques used from the product-based assignments. Often students will try things that are beyond what was "taught" and to that I would tell them to "Google it." By this point, students should have learned enough about the application environment to learn from others on the web. This is important, because as they learn the basic terminology, they establish important literacy regarding Photoshop that will allow them to learn on their own. Without these important foundational facts and terminology, learning to learn Photoshop would not be possible.

As with other uses of technology in pedagogy, technology use pulls instructional techniques in a certain direction. My product-project based approach naturally led me toward a more student-centered approach that was also congruent with Literacy with Information and Communications Technology (LwICT). By using technology for most things students do, the students are the ones that do most of the work, promoting a gradual release of responsibility from teacher to student. In my case, I generally just set out the conditions for learning and let the students create the path towards learning, and in many cases learning what they need to learn to accomplish what they want.

Although I generally do not teach the inquiry method directly as in LwICT (question/plan, gathering and making sense, produce to show understanding, communicate, and reflect), when confronted with a unique need, the inquiry method is often employed. For example, when wanting to reproduce a

specific video technique, students need to ask "What is this technique?" then investigate a way to learn it. They will then explore various resources/tutorials (usually from the web) to learn. They will then produce using that technique in their own form. They will then communicate as a group and to myself to determine if they've met their goal. They will often revisit one part of the inquiry cycle to achieve just the effect they are looking for to meet their needs.

The defeat of the second head of Cerberus is in the hands of the students. Let students use technology to achieve the curricular goals, setting up the conditions for learning with technology. Allow students to execute the objectives explicitly or as a teacher set up a hegemony for learning that lets students use the objectives. For me, using a product-project based approach allowed students to create and produce what they wanted using the results of the scaffolding of learning by creating simple products to the completion of major projects - all the while students are actively engaged in defeating the second head of Cerberus.

The third head of Cerberus is assessment. Traditionally assessment has meant a formal process of students proving they know what they are supposed to know through tests or exams. And it is still quite a common practice to have tests and exams as a test of knowledge using paper. The clickity-clack of the photocopier and the use of paper is strong in most summative assessment tasks, even with or especially for provincial exams. This is especially problematic since there is a strong inclination and ability to make much of the classroom environment and pedagogical processes paperless. Slaying this head of Cerberus for me involved looking at assessment differently.

I used to use assessment as a completely separate process from the first and second head of Cerberus (transmission and assimilation). Assessment for learning using technology allows teachers to use assessment as a learning tool. Because many of my classes had project work and many students were not in the same place in their projects, I often allowed students to take a test when they were ready to take them. Because students were at different points in the curriculum, it was impossible to give reviews or test preparation together as a class group. As I had mentioned previously, I would let the project assignments or project work inform the students of the objectives they need to learn for a particular unit. Either implicitly or explicitly, it is expected that students understand the objectives.

If students did not get the objectives, the test will help them learn the objectives. To most teachers this seems absurd, and I thought I was when I first tried it. However, the key for this technique to work is with use of technology. Using tools that can quickly create and mark tests are essential to using assessment for/of learning.

First, I have used a number of tools to create digital tests. My tools included Synchroneyes quiz (no longer available), Examview, Proprofs.com, Fluberoo, among others. Using simple response tests, such as multiple choice, matching, or fill-in-the-blanks questions, base the answers on the objectives you want students to know. Your questions and responses can be more detailed, specific and as numerous as would be needed to show understanding of the objectives. Normally using paper, this would be very time consuming to create and also to mark, but using digital tools, once the test is created it can be used over and over again, with the marking being done instantaneously by the tool. This is a huge advantage for digital assessment.

When students are ready to take a test, I would simply send them a link to the test and they would complete it. An online tool like Proprofs.com allows you to create tests with text, pictures, even video to support subject matter and student modalitites of learning. Once a student has taken the test, they will receive immediate feedback about their grade for the test. A certificate is issued to the student and I

require that students save that certificate to their personal storage (school server or the web) for proof of their grade (I also have a management system through Proprof.com that gives me the results but I am trying to get students to be metacognitive about their grades). Based on their mark, they may take their mark as a summative grade or they may take the test a second time and use the first test as their review for the second (summative and final) test on that unit.

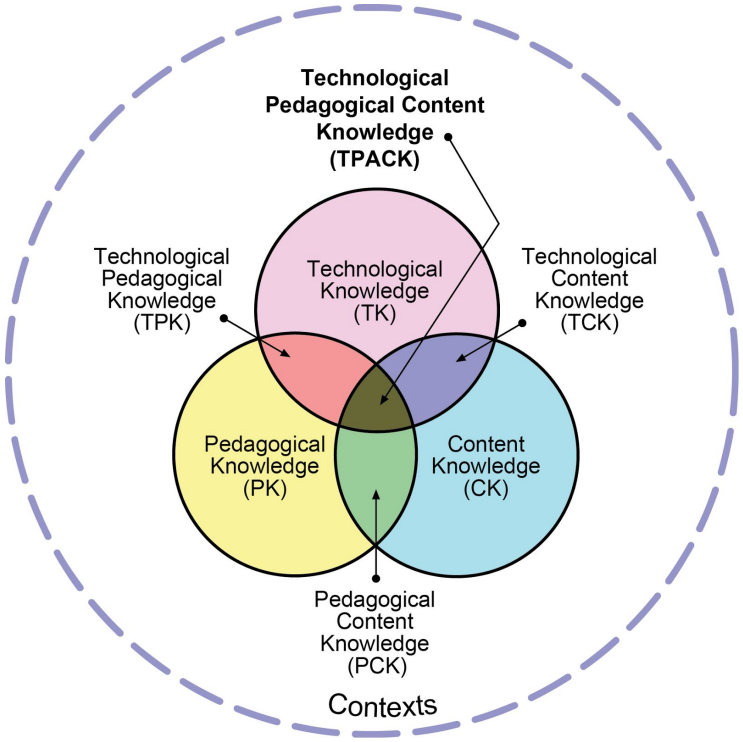
"But wait! They will surely cheat and get 100% all the time when they take the test a second time - that's crazy." I hear you screaming at this page. It's not cheating if the test represents the actual objectives of the unit - it is only preparation. The key is with how the tests are administered. First, I only let them take the second test two days later so that they have a chance to actually review their first version instead of just memorizing the answers. Second, the test system is set to randomize the question order and the answers for each question. This is extremely important because it means students need to understand the objectives. If they match the objectives to the answers and they can do this with random question order and answer order, that is what teachers do when conducting reviews for many fact based objectives. The reason multiple tries at a test are not done traditionally is that it is difficult to make multiple versions of a test and time consuming to mark multiple tries of a test. Most test management systems make the hardest part of administering tests easy and valuable tools to use assessment for learning.

Of course, you're right, this wouldn't work for longer form questions, and it doesn't work for all objectives, however, if you can use this technique for half of your assessment, this will save time for more substantive assessments. I have also used the assessment tools to administer all-at-once class tests where students are side by side on computers where they could easily look at each other's screens. But because the questions and answers are scrambled, cheating becomes impossible even though everyone in the class taking exactly the same test at the same time - very powerful.

Curious to the efficacy of my techniques, I examined students that were in my class and other classes that used traditional, paper-based summative assessment for units. I looked at a number of students: strong students, average students, and other students to see how test marks compared. In measuring Math, Science and History units of comparative lengths, every category of student scored within +/- 5% of all units within comparative units. This confirmed and actually helped to refine the assessment for learning technique that I had used in my courses. By carefully crafting your assessments for learning you can save class time in extensive reviews and differentiate class time for each student. For many teachers that like to prepare students with extensive whole class review before a test and then only give one chance at a test - if a student misses the review, then what? If students can use assessment for learning, they can review for themselves what they need to know for the summative version. It's a simple and somewhat counter-intuitive technique that many teachers that do not use digital assessment find hard to believe. However, after many years of using the technique, I can attest that it works.

For many years I was able to be the digital teacher, finding more and better ways to utilize technology into my classes. And as I did so, I realized that it wasn't that there was better technology available, or I had improved greatly as a teacher. I had been fortunate enough to teach similar courses over a long time which made me very aware of the details of the subject matter. This is important, because teachers who better understand their subject matter are better at integrating technology into their teaching. This idea, formally conceptualized as TPACK (Technological Pedagogical Content Knowledge), describes the convergence of technological skill, pedagogical skill, and content knowledge

as all important in having a great effect on the ability and effectiveness of technology integration in the classroom.



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Just as Hercules needed time to study Cerberus to better understand and exploit the beast, content knowledge (and greater understanding of curricula) is important to improve technology infusion into instruction. For teachers, it means picking subjects you like to teach and sticking with them longer; for administrators it means staffing choices that are appropriate and consistent. Teaching effectively with technology is not always about technology, it is about teachers and their comfort with their subject matter. For me this was especially important because I loved what I taught and wanted to know as much as I could, which helped me find better ways to use technology to teach my students.

And lo, with many tribulations and heroic effort, I had defeated the mighty beast, having defeated all three heads of Cerberus (transmission, assimilation and assessment) with technology. But wait. As an observant reader will note, I had a huge advantage over most teachers; my students were computer students who had computers available to them at all times. Unlike Hercules, who had to defeat Cerberus without weapons, I had a great arsenal from which to work with which serendipitously gave me a prescience of the possibilities of pedagogy infused with always-available technology.

Today, one name for always available technology in the classroom is called BYOD. BYOD (Bring Your Own Device) and other 1:1 technology initiatives give students and teachers the tools to take on all three heads of Cerberus with technology they can hold in their hands. BYOD allows students to learn on devices (aka computers) they know how to use when they want and where they want. With the use of Google Classroom on their devices, teachers can also have their class go with their students

whenever and wherever they want. It is a powerful convergence of technology and pedagogy that I had been fortunate enough to use because of the nature of my classes. The change in technology that has made ubiquitous devices smaller and more portable has also made ubiquitous learning possible to any student anywhere.

Technology is transforming every aspect of contemporary life; likewise, to keep education contemporary a comparable transformation using technology within schools is required. The ability of technology to liberate students from linear, one-size-fits-all pedagogy is not only transformative but for me was a natural consequence of technology usage itself. As teachers, we don't want to give them our world, we want to help them create theirs; this means using technology in ways that will help create their future. Although not all aspects of technology usage in schools is positive, a careful and purposeful use of technology aimed towards improving outcomes will help create the positive impact technology has on learning. The shift to entirely technology-based pedagogical approaches to teaching and learning will be the biggest change in education since the introduction of print. However disruptive the change to digital pedagogy may appear now, technology provides the tools for every teacher to be a Hercules in their classroom. The fight against Cerberus is imperative for all teachers, to at least refute the notion that you are not a mythological teacher, but more importantly to allow you to be a triumphant hero to your students.

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Part 4 - Where Do We Go From Here?

Chapter 13 - Creating an Empowering School Environment

Mike Nantais

If high school teachers and students are allowed the freedom to make use of social media for teaching and learning, will the school culture benefit? What would this mean for student-teacher relationships? How can we, as individual teachers at all levels, upset these traditional relationships? In schools, it is obvious who has the power in classrooms. What would happen if some of that control was shifted, if trust was extended to students? This story is about technology and how its use can contribute to building a culture of trust and empowerment. It is a story about allowing students to embrace their *hybridity*, as described by Jesse Stommel. One starting point is to recognize that students are more than just students; their online lives are a part of who they are, and it cannot be ignored. They live a hybrid life; in school/out of school, online/offline. Can we honour this hybridity and give them the power to engage in all aspects of their world?

Neil Selwyn, in *Distrusting Educational Technology*, suggests that educational technology researchers should "conduct research that addresses the 'messy realities' of educational technology use *in situ*" rather than "evaluations of best practice and speculative reports of potential applications" that serve the consumption of digital technology. It was with the intention of examining the use of social media in a real school, with everyday teachers, that I did my dissertation research. What worked? What didn't? What were the unforeseen changes? I was interested in the reality in a typical (if there is such a thing?) rural, public school. To this end, my study used a qualitative multiple case study approach, following nine teachers as they made use of social media in their teaching practice over a six month period in a rural school in a Canadian prairie town. While I was interested in the "what" and "why" of social media pedagogy, my real interest was in the effects on practice. What would be the spin offs? Would it affect school culture?

The popular and academic literature is replete with both utopian and dystopian visions of using technology in schools. It seems that dichotomous views are plentiful. For some, technology will be a "disruptive" force that will transform education, and for others, it will have negative consequences. It seems rare that the shades of gray that surround technology use in education are explored. Much has been written about its "affordances", but what actually happens in the day-to-day reality of schools? I admit that I am a fan and long time user of technology. I started learning computer science in the early 1970's when I was in high school. Back then, we programmed on punch cards and sent them off to a mysterious mainframe computer located somewhere else. Later, I was teaching when the first desktop computers arrived in the late 1970's and I have been exploring their use since then. It is perhaps because of this long experience that I am interested in those shades of gray. Stephen Barnard wrote about *technorealism*,

which suggests that we should look at both the positive and negative aspects of technology, and not just assume either an overly optimistic or pessimistic view. My investigations and experience have lead me to believe that Neil Postman was right when he wrote that using technologies in schools are "Faustian bargains, giving and taking away." I contend that we need to be open to examining criticisms of educational technology and to looking closely at how it is actually used, and what results when it is. My study was an attempt to look at some of those gray areas and see what happens in a K-12 school and see what the cautions, concerns, and benefits are, if any.

The first observation that made clear that this school was different from some others was that the teachers were trusted to use the tools that they thought would enhance learning for their students. This fact alone would be interesting to follow up on; was it the rural context? An existing culture that extended trust? Whatever it was, I am certain that this freedom contributed to the findings I will explore here. When I asked the teachers participating in my study about the effects they perceived in the school culture after allowing the (almost) free use of social media, the comments, with few exceptions, were positive. Schools, and education, are complex, human affairs, and it was difficult for my participants to state the exact effect of embracing social media. They did, however, suggest that it, along with a number of other factors, combined to create a change in the school culture. Some of the other factors cited were a focus on formative assessment practices and a move to allow students to use their own devices, including smartphones. I prompted the teachers to reflect specifically on the role of social media in those changes; their responses were interesting and thought provoking.

Several media were being used by the teachers: some used Twitter, some blogging, others used Facebook. One prefered a more closed medium and used Edmodo. Regardless of the medium used, the most common response to the perceived effects on the school culture was centred on increased communication. In particular, the most interesting responses were about how social media use led to increased connections with students. These responses were contrary to much of the prevailing criticism of social media. This criticism often characterizes social media as isolating and that those indulging in its use often ignore those around them. When we as teachers actually stop and explore, rather than condemn, good things can happen. One teacher commented on the gains this way: "What has been gained is that, believe it or not, you connect more with the kids," and this helped to build a "personal bond with the kid." Another teacher added, "You get to see the kids in a little bit different light…you get to know them more as people." These teachers described how using social media opened up new connections to students who they might not connect with had they not used social media. Even those teachers who were new to using social media, and held reservations about it, talked about increased communication and connection. One teacher observed that social media allowed some students, normally hesitant to approach a certain teacher, a more comfortable venue to do so. There are some who might think it is better to keep a "professional" distance, but these teachers pointed out how the increased communication led to better relationships with benefits that spilled over into academic work. Several teachers talked about how students contacted them outside of school hours. While boundaries to this type of contact were necessary and were set, the teachers noted that this type of contact was not an issue for them and that they prefered to help students when they needed it. Admittedly, this access after school hours is not for everyone, but for several teachers it proved beneficial. The mindset and teaching philosophy of the teacher is important to this type

of “anytime, anywhere” access. In my experience, teachers do care about their students and their learning. While limits needed to be set, the results in this school were of obvious benefit.

Not everything was enthusiastically positive though. While recognizing benefits, some cautions were noted as well. One teacher pointed out, “I think the kids are a lot more informed with social media. They are all in tune with that, and you see it in our school, in the hallways. As soon as they are dismissed, out flip the phones. So I think the kids are more informed, definitely . . . If I look at it from a student’s perspective, they are more relaxed because they are more connected with each of their subjects, with their peers. [However] there is also that darker side of social media within the school environment and there’s still some of it that goes on.” Most of the participants stated that one of their reasons for using social media was to model and teach about appropriate use, rather than ban it. Similarly, the school Principal also talked about these issues, however, he pointed out that these possibilities were not a reason to ban its use. The attitude here was that while caution was advised, education was more effective than ignoring or banning this aspect of students’ lives.

When we look at the literature and popular media, one of the biggest concerns surrounding social media use in schools is it’s distracting nature. Nicholas Carr, for example, warns of the destructive nature of the distractions, while Howard Reingold, who admits these distractions exist, promotes the management of distractions. In the particular school in my study, distractions occurred, but it was, surprisingly, not a major concern. Only a few teachers mentioned it, and only to say it was not a major problem. “It’s not the big deal that we thought it was going to be, in terms of distractions and things like that.” In one case, the teacher discussed the appropriate and expected use of social media and personal devices with students. Involving students in this discussion helped lead to a positive outcome. He expected and modeled responsible use and, with very few exceptions, got it in return. The lesson here was that if we trust students, and involve them in decisions, most will return that trust.

Another point of concern for some of the teachers was about their own use, knowing that social media was not private, thus they had to be cognizant about how they used it. Reports of teachers getting themselves into trouble — even being fired — were known to them. These teachers realized that boundaries needed to be set, and they recognized that they simply had to be thoughtful about how they modeled the use of social media. It was gratifying to see that they were not ruled by fear, but rather were thoughtful about their use of the media.

Interestingly, several of the teachers talked about “a sense of empowerment”, “more freedom”, autonomy, and “giving kids as much choice and control as you possibly can.” As a result of giving students more responsibility and more control, teachers helped them to be “more accountable” and responsible. In this way a more trusting and caring school environment seemed to grow and develop, engendered by new ways of connecting and communicating. Teachers described a tension in the past, “there was this ‘us versus them’ mentality where the kids were trying to hide and pull one over on the teacher. You don’t see that anymore” as students communicate with teachers “on a different level.” One teacher stated, “Give them some control … You may be surprised at what they do.” These teachers saw that releasing some of their control and giving it to students resulted in learning benefits for their students.

A few years ago, I came across a concept described by John A. Weaver and Karen Grindall, in *Unauthorized Methods: Strategies for Critical Teaching*. They wrote about what they called “critical techno-mania”, which they described as being “concerned with technology’s potential to enhance the

process of empowerment emerging from dialogues between students and teachers." While I was hesitant to be called a "maniac", this concept certainly caught my attention when Weaver and Grindall suggested that this critical technomania should be used to "promote hybrid identities" through which students and teachers could "challenge forms of domination." A powerful sentiment and way of looking at technology use in schools that resonated with me, and I believe is what I witnessed in this school. Can we become *critical techno-maniacs* in this sense? Are we willing to engage in dialogue with our students and challenge hegemonic structures in our schools?

In a recent article, Audrey Watters discusses the role of educational technology criticism, suggesting that educators should be less technocentric and should consider the ideology and power involved with the use of technology. With all of these ideas in mind as I reflected on this particular school's experience, I concluded that it is was not simply the act of allowing social media use, or personal devices, that led to this trusting school environment. It is more the act of changing "traditional classroom hierarchies" by releasing some traditional authority and power, by trusting students, and enabling them to embrace their hybrid selves, that has led to increased connection, a sense of empowerment, and a positive school culture. More than simply allowing social media use or personal devices, this is about recognizing the hybrid world in which students live and extending trust — and gaining trust in return. How can we, in our own teaching contexts, shift some control to extend trust and empower students?

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Chapter 14 - Digital Citizenship Reconsidered: Global Citizenship In A Digital World

Reynold Redekopp

> *Choruses from The Rock* T.S. Eliot, 1934
>
> The Eagle soars in the summit of Heaven,
> The Hunter with his dogs pursues his circuit.
>
> O world of spring and autumn, birth and dying!
> The endless cycle of idea and action,
> Endless invention, endless experiment,
> Brings knowledge of motion, but not of stillness;
> Knowledge of speech, but not of silence;
> Knowledge of words, and ignorance of the Word.
> All our knowledge brings us nearer to death,
> But nearness to death no nearer to God.
> Where is the Life we have lost in living?
> Where is the wisdom we have lost in knowledge?
> Where is the knowledge we have lost in information?

Digital citizenship is an old, tired concept, sort of like that of Digital Natives. Current ideas are based on a good idea but don't really embrace the scope of what it might mean to live in a digital world. I propose that we need to think broader than merely how we use our devices and acknowledge some of the implications or hidden costs of the technology we love so dearly. And, clearly, as the co-editor of a book on great ways to use technology with students, I am not looking to ban these devices from our homes and schools. But our digital technology connects us to the global community, and with great knowledge comes great responsibility (and maybe some wisdom.)

What I propose is that we move the focus of thinking about our technology from one where we are mostly concerned with how to use a device appropriately and how to protect ourselves to a focus on the greater implications of having and using our wonderful devices. Simply put, we tend to focus on how to be wary digital content consumers and cautious content producers. The ideas we need to discuss go well beyond the typical Digital Citizenship norms and increasingly must include essential concerns around design, mineral sourcing, production, consumption, energy, reuse, and recycling. It also means teaching students (and teachers) how to get out of the 'echo chamber' where all they see/hear only reinforces what they already think and doesn't lead to understanding the views of others.

Current digital citizenship models (and they are good at what they do!) include statements such as: "Digital citizenship is the norms of appropriate, responsible technology use." (DigitalCitizenship) or "to empower students to think critically, behave safely, and participate responsibly in our digital world."

(Common Sense Media) and "The 21st Century Citizenship Guide outlines a vision of citizenship that encompasses **informed, engaged and active practices** in three dimensions of citizenship—**civic, global and digital**." (Partnership for 21st Century Learning) Most of this is about personal use. "When we stop worrying about smartphones just in terms of content (what we're looking at) and start to consider the rituals that tether us to them throughout the day, we'll notice that the very form of the practice comes loaded with an egocentric vision that makes *me* the center of the universe." (Smith, 2016, p. 46.) We have to get beyond the *me*.

These definitions (and many sites don't bother defining the term) then give direction to details as to how this is to be achieved. These are worthy goals but tend to be very individualistic and self-centred: overuse of the internet or games, cyberbullying, pornography, safe posting of comments, ideas, and images, copyright, respect, assessing validity of information, security, and body image. (from the above sources as well as MediaSmarts and Osapac.) An unusual concern for future consideration is Jason Ohler's vision of the digitally physically-embedded citizens we will teach: "Currently the world of digital citizenship is understandably focused on issues like cyberbullying and sexting. But I fear these will seem quaint when compared to the issues that await us… like those that will accompany the coming of the bio-hacked student."

Many sites present some variation of 21st Century Skills most of which begin with the letter C. The most common of these notable C words are communication, critical thinking, collaboration, creativity, and citizenship (from Thoughtful Learning and Partnership for 21st Century Learning.)

An interesting model is proposed by C21 Canada and their document Shifting Minds. The bias behind my choice here is that they include two C's that are not evident elsewhere and appear to head in the direction I am encouraging: *Character* (Reaching higher and growing stronger), and *Culture & Ethical Citizenship* (Sharing what we value.) Among other virtues, the Character section lists "tolerant, ethical and fair" (p. 11) and in the Culture and Ethical Citizenship category we find, "the impact of humans upon the environment ... and ... sensitivity and respect for diverse identities and cultures as impacted upon our sustainability" (p. 11.) These too are worthy goals. Along these lines the OECD (Organization for Economic Cooperation and Development, 2009) advocates a *Social responsibility* component that "implies that individuals' actions may have an impact on society at large, both in a positive sense (i.e. thereby a responsibility to act), but also a negative one (i.e. responsibility to refrain from certain actions)" (p. 10.) They also delineate *Social impact* that recognizes both the social life implications and environmental impact of our technologies.

But where do we go with this? Neither of these latter frameworks provide real detail on what exactly these mean in action, and the little detail that is given tends to focus on individual development and tends to be very localized when dealing with the 'issues.' We need to broaden the scope of these issues to a global context and redefine digital citizenship as global citizenship in a digital world.

What is citizenship? Darin Barney (2007) offers this way of describing citizenship:

> I would like to suggest that citizenship, like science and technology, is a way of knowing and acting, a way of being in the world, a practice. To say that citizenship is a practice is to say that it is something not merely borne but more precisely something done, not just an attribute but an act, not simply a status inherited passively or won through due process or struggle but a habit motivated

> by circumstance and obligation, cultivated through education and experience, consistently performed. (p. 11)

This is an active, ambitious description of citizenship, the kind we seem to need as political participation seems to wane. So what then is global citizenship in a digital world? How do we help our students make 'a habit motivated by the circumstance and obligation' of living in a digital world? I suggest awareness of the whole process of technological development leading to an examination of ethical and environmental concerns. This means students need to know about the whole process of producing their devices from design to recycling. Here are the areas I propose our students should engage with. All of these have potential for great cross-curricular projects. Check my wiki site for more sources and resources.

Design - Why do we have to dispose of our phones when the battery fails or we want a better camera or we want more memory? Most of our devices are designed to be difficult or impossible to upgrade or fix. This is a phenomenal waste, so before we even get to the process of making a device we have an environmental problem by design. Students should be aware of this and be able to find methods of persuading companies to make devices that can be easily upgraded and fixed. Responsible use of social media in this case means active citizenship: much more than not posting rude comments. It means participating as a global digital citizen 'motivated by circumstance and obligation' and taking action to investigate the problem and decide how best to use their influence. This will also be an excellent opportunity for them to learn about argument, rhetoric and product 'spin' as companies defend their policies and actions. They may also begin to question if profit is the only motivator for companies. They should also be aware of some of the positive efforts already in progress like Project Ara and PhoneBloks.

Mineral Sourcing - Tantalum is a rare earth element that is used in most of our current electronics. Congo used to be a major source of tantalum ore until it became evident that mining it was a major source of funding for the ongoing conflicts. There is now a concerted effort to try and source 'conflict-free' coltan - the ore from which tantalum is extracted. This is an effort to be applauded, but students at some point should also be aware of the consequences of any action. In this case many miners are now unable to make a living due to the slow implementation and monitoring of the mining of coltan. There are many good questions to investigate here, including why we don't get our tantalum from Canada.

Manufacturing - Where are our devices made and under what conditions? Many device manufacturers have poor records for treatment of labour and lack of environmental precautions: see ChinaLaborWatch and TheWorldOfChinese articles for example. As we know from the coffee, chocolate and clothing industries, companies must be constantly scrutinized and information has to be shared. Students should learn about the manufacturing process that produces their devices so that they can decide if they want to take action or support a cause.

Consumption - How often do I need a new device? Should I get a new one every time my 'plan' ends? These are questions that might arise as students do inquiry projects into the background of their technology. They are critical questions for students (and adults) to ask of themselves. These questions do not have simple answers and students will struggle with their desire for the newest and shiniest versus their own ethical standards. Student debates on these topics might prove helpful. Presenting findings to parents might also be advantageous.

Energy - How much energy does a Google search take? How clean is that energy? What is 'The Cloud' really? What is a server farm? What happens to all the excess heat from a server farm? Are all companies the same? These are all worthy topics for an inquiry.

Recycling - This one seems obvious – of course we should recycle! But what happens when we drop off our used equipment? The process is getting better, but there are always poor examples as this documentary from *60 Minutes* illustrates. More and more companies are providing information about their efforts to be cleaner and greener. Examples are HP Computers Sustainability site and Apple's Environment page. Is there a bias to these pages? Of course! That's why students need to be good investigators and ask good questions about what's there and what's missing.

Cost - How much more am I willing to pay to fix all these problems? This is a really challenging question to answer, both logistically and emotionally. That doesn't mean it shouldn't be discussed.

No guilt!! Guilt is a poor, short-term motivator. If we want students to be global citizens we have to help them move beyond the potential guilt to a place where they can find ways to meaningfully engage in finding solutions. One of the advantages of their devices is that they can take action in effective ways, locally and globally. Action of course doesn't have to be through electronic media and should often be personal and physical, but there are terrific opportunities to connect around the world and make a difference. They need to get into 'a habit motivated by the circumstance and obligation.' We can provide them opportunities to develop these habits through learning situations.

What are the Obstacles and Opportunities?

A major obstacle to doing this is attitude. We live and learn in a very individualistic society and sometimes get lost in that point of view. We rarely reflect about whether we control the device or whether it controls us. We also need to understand the nature of our consumer driven society and the companies that encourage us to buy. They are profit motivated and move production around the world to find the lowest costs, and they don't necessarily want us watching them closely.

> In particular they don't want us to ask, 'Where does all this stuff come from?' Instead they encourage us to accept a certain magic, the myth that the garments and equipment that circulate from the mall through our homes and into the landfill simple emerged in shops as if dropped by aliens. The processes of production and transport remain hidden and invisible, like the entrances and exits for the characters at Disney World. This invisibility is not accidental; it is necessary in order for us not to see that this way of life is unsustainable and selfishly lives off the backs of those in the majority world." (Smith, 2016, p. 53)

So what can we do? Again, avoid guilt, but give opportunities to collect good information and opportunities to act and act responsibly. There are lots of great cross-curricular inquiry projects that students can work on such as investigating issues around any of the topics mentioned above. We also need to demonstrate to students how to get a broader perspective in order to leave their personal 'echo chamber.' We and our students tend to friend/follow/like people who have the same kinds of opinions we have and we unfriend/unfollow those whose opinions disagree. What we therefore get from all our social media and news sources is an echo back of what we already know and like. It will take significant effort

on the teacher's part to encourage project work that looks deeper and wider. We all need to obtain authentic news from a variety of sources. Teachers must also make it a part of their lives to understand (but not necessarily agree with) other perspectives on issues. One example in a history, geography or world issues (or many others) class is to have the headlines from a different newspaper/media source on the screen every day so that students can see what people in other parts of the world think is important. Sadly but notably, as Canadians we will find out that we are not in the international news very often!

In my one of my courses at the Faculty of Education (U of Manitoba) students have the choice to explore alternate perspectives. They all find it painful at first if they choose this assignment, but at the end they are all grateful for the experience and how much they have learned.

Alternate Media Immersion

Spend one to two weeks breaking your 'normal life' RWL (Reading, Watching. Listening) habits and RWL very different places - politics, religion, music, video, etc. That is go to websites, stations, news, youtube channels that you generally would avoid like the plague and spend some time there. You do not need to go to 'deviant' places, just places where you disagree with just about everything they stand for.

Your assignment (should you choose to accept it):

1. Keep a journal (written, audio or video or ... not too long - think first!) of your gut reaction to the experience - we already know that you are not like them, so how does it feel to be among them?
2. Avoid condemning/hating and do some deeper listening. Why is there this difference? What are the core beliefs, and how do these get muddled/clarified through the medium and message? Can you get beyond the right/wrong types of arguments? Where are areas of agreement or reasonable discussion? So, move beyond your gut reaction and record (written, audio or video or ...) your considered thoughts after discerning some of the deeper ideas.

You are not expected to change your mind, but perhaps to have a better understanding of how and why some people think differently than you.

How do we approach some of these hard topics? How do we start the conversation between students and their technology? How do we help them understand what it means to be a global citizen? We need to know some of the questions we should ask to get us and our students started. Mander (1991, 49-50) provides a list of thoughts we should consider about our technologies:

- Be skeptical of all claims of new technology.
- Assume guilty until proven innocent.
- Bear in mind that technology is not neutral or value free.
- Negative aspects are slow to appear and blinded by the attractions of the new and now.
- Look beyond your personal benefits to a more holistic view of its impact.
- How does the new technology fit into the larger technology web?
- Is the control of the technology local or centralized somewhere inaccessible?

- Consider things like isolation, crime, suicide, abuse (drug or economic), jobs, and culture change.
- Rejecting or containing a technology is possible - nothing is inevitable.
- Recognize technological worship for what it is.

None of this is beyond the scope of students at any level but educators must be willing to ask these questions and enter into conversation about them.

> From *Little Gidding*, T. S. Eliot 1942
>
> We shall not cease from exploration
> And the end of all our exploring
> Will be to arrive where we started
> And know the place for the first time.

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Rennie Redekopp has been using and thinking about digital technology since someone brought a Commodore Pet into his classroom and asked him to see if there was any educational value to these things: despite no connectivity, no resources, and a cassette tape player to save your program. At least it had a whopping 32 Kb of RAM!! That has led to a lot of experimentation looking at how to use each generation of computer/device in effective ways.

Chapter 15 - Why it Matters: How Technology Might Help to Close the Ecological Knowledge and Knowledge-action Gaps

Matt Henderson

What I am about to offer is my experience as an educator who attempts to open the world up to his learners through the use of technology, authentic experiences, and critical discussions about the human experience. As Viktor Frankl (1959) suggests, the only thing we have on this planet is our experience. This is something that cannot be taken away from us.

I am not offering this contribution to tell you the reader how to teach or to pretend that I know something that you do not. I merely wish to enter into a dialogue about how and why we teach and learn and how we might help our learners contend with arguably the greatest challenge our species has ever faced: the present ecological crisis.

For those, however, who need their thought leader fix, I give you this example of a thought leader form the folks at *CBC's This is That*.

With all joking aside, I have been placing a great deal of thought into my contribution to this chapter and how I have used technology to help learners critically examine the ecological crisis and how they might develop solutions and ultimately create sustainable communities. Fortunately, I have been afforded an incredible setting this summer to help inspire my reflection and writing, as my dear friends have leant my family their cottage which is situated on the shores of Lake Winnipeg. This mighty lake is an unfortunate metaphor for how we have truly detached from all systems on Earth, and how we perpetually fail to take care of the very thing that sustains our lives.

In the last few days at this cottage, I have raided the tiny library located within it and found Dava Sobels' *Galileo's Daughter*, a history of this 17th century thinker based on letters from his devoted daughter Celeste. It is a brilliant history that showcases the learning process and how norms are challenged and the potential repercussions for examining the truth. My brief vacation has also afforded me the opportunity to engage in a long-held Henderson tradition. My youngest child recently turned five, so as family tradition dictates, I deemed it time to show him the most essential film related to child development in the western world: *The Last Emperor*! (My "Dad of the Year" certificate is in the mail, no doubt.) Truth be told, this was the only film I had in my briefcase.

Both the book on Galileo and *The Last Emperor* have generated great conversations at our dinner table about history and the human experience. My son had out-of-this-world questions about human history and its context within the the planet and universe. As any father does, I attempted poorly to respond to his questions in any intelligent manner and tried to suggest to him that despite the fact that humans have not be around for along time, we have had a most significant impact whereby we have created a new geological age: the Anthroprocene. I love to use this film to help my learners wrap their brains around our species' insignificance and significance.

This film identifies two ideas. First, it reinforces the fact that as a species, we are indeed insignificant, at least in terms of time. Second, it also makes it abundantly clear that we could be gone very soon and the planet will keep on hurtling through space without a blink of an eye. During *The Last Emperor*, my son had fantastic questions, such as: "Why does the Emperor of have two wives?", "Why

are the Japanese so angry all the time," and "How come nobody would tell Puyi the reason why he couldn't leave the Forbidden City?" This last question hit me as the "Big Lie" in the Emperor's young life. Galileo was certainly up against the "Big Lie" of his time and was placed under house arrest for challenging the Papacy and its last grips on the the notion that the universe revolved around the Sun. Galileo was lucky to escape with such a light sentence!

And so this brings us to the big lie of our generation; the lie where we try to cover up the ecological crisis. Where we whitewash the implications of human activity with stories of the economy. A lie where our Minister of Natural Resources and our Minister of the Environment can sit side-by-side and talk about meeting Paris targets by building more pipelines. A lie ultimately based on the suffering of the most vulnerable people on the planet.

The Crisis

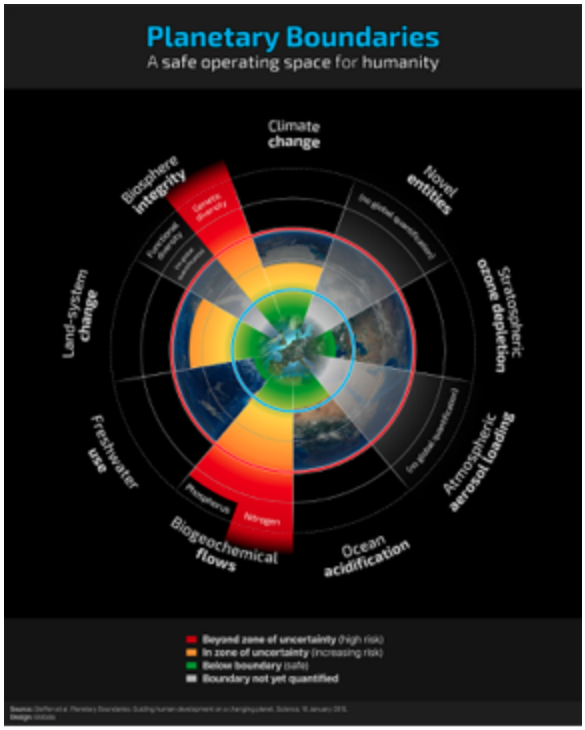

FIGURE 1. TAKEN FROM: HTTP://WWW.STOCKHOLMRESILIENCE.ORG/RESEARCH/PLANETARY-BOUNDARIES.HTML

There is a crisis. The Earth is warming up. This is undeniable. But the ecological crisis is far greater and more complex than the warming of climate. According to Rockstrom et al (2009), who have developed the Nine Planetary Boundaries 9 (See Figure 1), we are pushing the limits of the planet in terms of the conditions whereby our species can exist safely.

In 2009, the group of scientists suggested we had surpassed three of the nine planetary boundaries. In 2015, they updated it to four of nine. The boundaries are an exceptional avenue to reveal the crisis to learners, who can begin to see how human activity has a far greater impact than simply a warming climate. The model also reveals that billions of systems are at play on Earth, and that we form just one link in this complexity. You can see Figure 2 for a more linear explanation of the pressures on these boundaries.

The 9 planetary boundaries

To keep Earth hospitable, we need to live within 9 specific limits. Here's how we're doing in 2015.

	BOUNDARY	WHERE WE ARE TODAY
1. Climate change	Atmospheric concentrations of carbon dioxide at no more than 350 ppm	Carbon dioxide levels are at 400 ppm and climbing
2. Lost biodiversity as species become extinct	Maintain 90% of biodiversity	Biodiversity has dropped to 84% in parts of the world such as Africa
3. The addition of phosphorus, nitrogen (and other elements) to the world's crops and ecosystems	Worldwide use per year of about 11 teragrams (Tg) of phosphorus and 62 Tg of nitrogen	Up to about 22 Tg per year of phosphorus and 150 Tg of nitrogen
4. Deforestation and other land use changes	Maintain 75% of the planet's original forests	Down to 62%
5. Emission of aerosols (microscopic particles) into the atmosphere that affect climate and living organisms	Global boundary unknown, but regional effects (such as on the South Asian Monsoon) occur when Aerosol Optical Depth (AOD) is more than 0.25	Up to 0.30 AOD over South Asia, but probably well inside (or below) the boundary over most of the globe
6. Stratospheric ozone depletion	Less than 5% below pre-industrial level of about 290 Dobson Units (DU)	Still safely inside the boundary except over Antarctica during spring, when levels drop to 200 DU
7. Ocean acidification	When the oceans become acidic enough that the minerals sea creatures need to make shells, such as aragonite, begin to dissolve	Still within the boundary, which won't be crossed if we can stay within the climate boundary of 350ppm of CO2 in the atmosphere
8. Freshwater use	Can use up to 4000km³ of freshwater a year	We use around 2600 km³ of freshwater per year
9. Dumping of organic pollutants, radioactive materials, nanomaterials, micro-plastics, and other novel or man-made substances into the world's environment	Unknown	Unknown

FIGURE 2. TAKEN FROM: HTTP://IDEAS.TED.COM/THE-9-LIMITS-OF-OUR-PLANET-AND-HOW-WEVE-RACED-PAST-4-OF-THEM/

Rockstrom himself explains, via an outstanding TED talk that is based on science and evidence, the pressures on the planet and offers a ray of hope — something that is critical for educators to do with our learners. This TED talk is critical for all educators to take in.

The scientific evidence is staring us in the face. According to Rockstrom et al, the Intergovernmental Panel on Climate Change, and virtually the entire scientific community, the geological stability required for our species to operate safely is at risk. But there appear to be gaps in human cognition which prevent us from developing real solutions.

The first gap is what I call the Knowledge Gap — that is the gap in our knowledge of the ecological crisis and the natural world. As educators, what is our role in closing this gap and how might technology help our learners understand how their lives are fundamentally connected to all systems on Earth?

The second gap, the Knowledge-Action Gap is what Plato referred to as Akrasia. It is our paralysis or our inability to take meaningful action when we are indeed aware of the crisis and the natural world. We see this in the vehicles we drive. Anecdotally, they seem to becoming larger when we all

understand that heavier vehicles will consume more fossil fuels. This second gap is well articled by Marxist philosopher Slajov Zizek:

FIGURE 3. TAKEN FROM: HTTPS://WWW.YOUTUBE.COM/WATCH?V=YZCFSQ1_BT8

"We know the (ecological) catastrophe is possible, probable even, yet we do not believe it will really happen." (Zizek, 2011, p. 328)

The Knowledge-Action Gap became highly apparent to me when I was teaching a group of young learners in Brazil. We were studying the giant pools of plastic which have accumulated in our oceans, and we were using the infamous story of the 30 000 rubber duckies which fell off a cargo ship in 1992 as a means of exploring currents and trade winds. See Figure 4 for the NPR story:

Figure 4. Taken from: http://www.npr.org/templates/story/story.php?storyId=1323675

We became engaged in the use of plastic and realized that the school itself used plastic cups instead of water fountains as the building itself was an old warehouse and not yet equipped with all the regular school infrastructure. But at one point a learner named Rodrigo asked THE question:

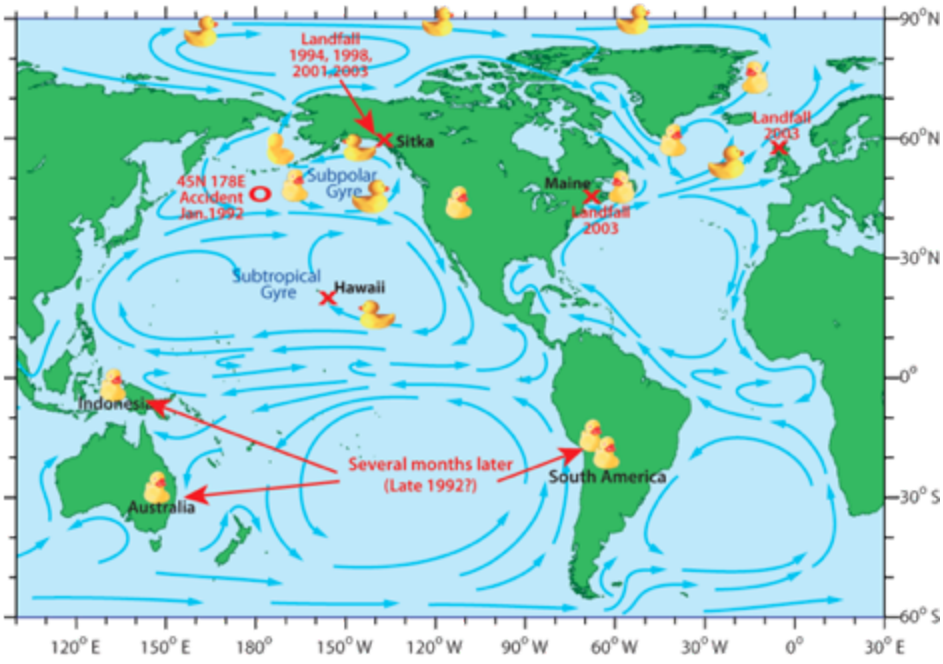

FIGURE 5. TAKEN FROM: HTTP://WWW.SEOS-PROJECT.EU/MODULES/OCEANCURRENTS/OCEANCURRENTS-C02-WS01-S.HTML

"If I am a person who really wants to help the environment, then why do I do things like use plastic cups when I know that it is bad?"

This question knocked me down for a time and I had difficulty answering Rodrigo's question. I had to do some critical personal reflection and ask some big questions: If I am a person who really wants to help the environment, then why do I take planes? Why do I use internal combustion vehicles? Why do I freely participate in an economic system which at its core is about exploiting natural and human resources? As educators, how do we equip our learners with the skills, abilities, and literacy necessary to close these two gaps? My inquiry has led me to two hypotheses. First, learners need to be immersed in **educative experiences** which reveal how they are interconnected and interrelated with all systems on Earth. Second, These experiences need to lead towards learner-driven action, transformation, and a new **ecological literacy**.

By ecological literacy, I offer this definition: To understand one's connectedness to all systems, to appreciate the finite carrying capacity of the Earth, to predict consequences of human activity, and to ultimately create sustainable communities through action. Literacy refers to the skills and abilities to create new knowledge and ecological literacy relies on not only knowledge of the natural world, but also the drive to take meaningful and informed action — namely the notion of praxis.

Given the need to foster this ecological literacy in order to close the knowledge and the knowledge-action gaps, I set out on a journey to try and design experiences which might lead to this goal. With my hypothesis in mind about closing these gaps, I needed to seek out other people, schools, and programmes which had already traveled down this path. Some of the schools I visited, some people I have connected with on Twitter, and others I have simply known about through the literature. Some of the schools are public, some are independent, and some are charter schools. But all have a commitment to learning and fostering this sense of ecological literacy through the design of educative experiences. Here is a sampling of some of the schools I explored:

The Met
Eagle Rock
Soundings
Forest Schools
Hobsonville Point
Riverpoint Academy
High Tech High
Northwest Passage School
Punahou School

Based on my investigation, I began to put together a criteria of experience that would lead to an ecological literacy and one I could use to help design educative experiences. The first part of my criteria deals primarily with outcomes as advocated by the Centre for Ecological Literacy in California. The second part of my criteria borrowed from Dewey, who speaks specifically to the design of educative experiences. The above mentioned schools all exemplified outstanding examples of how one constructs educative experiences. The third part of my criteria borrowed from Freire, who informed the criteria in

relation to notions of dialogue, reflection, and praxis. You can see the criteria figure 3. Please use it, improve it, or disregard it as you see fit.

Learning Activities and Experiences

Equipped with my hypotheses about how to close the two gaps and with my new criteria of experience for fostering an ecological literacy, I have attempted to design educative experiences. Many of these incorporate the use of technology, while others have learners out in the field, engaging with nature and the community.

Here is a list of learning activities and educative experiences that might help foster an ecological literacy within your learners. Better yet, you might be able to take them and truly make them powerful opportunities for growth. While these are not complete educative experiences, they can be meaningful concrete experiences, assessment opportunities, and/or an opportunity to prime the pump, so to speak:

FIGURE 6: CRITERIA OF EXPERIENCE FOR AN ECOLOGICAL

KQED DoNow. The KQED DoNow, a weekly activity designed by the folks at KQED, an NPR station in California, is an incredible opportunity for your learners to engage in real-world problems and connect with each other to develop solutions. Learners used Twitter to connect with other youth across the continent. KQED asked learners to use a variety of technologies to create new knowledge and were asked to post on Twitter, Instagram, Vine, Soundcloud, etc.

Global Issues Take Action Projects. The new Grade 12 course in Manitoba which replaced the old World Issues course, is based on praxis, inquiry, and ten critical themes. Learners in my class have developed climate change conferences, built a solar panel to power our class, created films on sustainability, performed waste audits, and designed sustainable cities. In recent years, my teaching partner and I combined the Grade 12 ELA course with the Global Issues course and based all ELA reading around the ten themes of the Global Issues course. Learners were asked each week to use a variety of technologies to organize projects, design new cities, create podcasts and films, and collect and analyze data. Learners exploited Google apps for Education, used Trello to complete collaborative projects, and used Instagram, Vine, Soundcloud and other social media platforms to launch their offerings into the world.

Lecture Series on Ecological Literacy. In January 2016, SJR hosted a lecture series on ecological literacy based on the content knowledge David Orr suggests our students need in order to become ecological literate. We felt we needed to prime the pump, so to speak, before learners were to begin implementing their Take Action Projects. Learners used Evernote as a means to capture their notes, audio, video, and other points of interest during the interactive lecture series. Learners then created their own recorded half PechaKucha presentations (10 slides that change every 20 seconds) and launched these on Vimeo explaining what they thought ecological literacy is.

Living Rainforest. A brilliant organization out of the UK, the Living Rainforest is a phenomenal resource for all educators and offers an outstanding essay competition for all ages. This essay contest poses ethical questions related to the ecological crisis and allows time and space for learners to create meaningful solutions. The question in 2016 was related to sustainable cities, and our preparation in the Global Issues class led us to designing our own chairs in via the Chair Your Idea initiative, followed by conversations with city planners, architects, and social activists. Learners then planned their own utopian cities after we read various utopias and distopias, including *1984, Brave New World, Animal Farm, and Ecotopia*. Learners created their own manifesto GIFS to offer an argument as to how cities might become more sustainable. All of this culminated with their submission to the panel at the Living Rainforest. Learners were able to use a variety of technologies, both digital and analogue, to help them think about cities and themselves.

University of Manitoba Glassen Essay Contest. The Glassen Essay Contest, out of the University of Manitoba's Centre for Professional and Applied Ethics, is another opportunity for learners to engage in in problem-posing and solutions-based thinking in an authentic arena. While the questions posed may not be directly related to ecological literacy, they do often require the development of empathy for all forms off life on the planet. The question in 2016 focused on the global refugee crisis and we used a variety of technologies to research the crisis and eventually develop our own refugee camp simulation.

FIGURE 7. LECTURE SERIES ON ECOLOGICAL LITERACY

FIGURE 8. LEARNERS TAKE THE WALKING SCHOOL BUS.

Walking School Bus. When I was working at SJR, in order to use public transit, we would have to walk two kilometres to the nearest thoroughfare. This process became known as the "walking school bus" and was often bemoaned by learners. What it did, however, was provide our learning communities with an opportunity to connect with local flora and fauna while engaging in conversation without technology. When we did meet the main hub, we were able to jump on Bus Rapid Transit and engage in further conversations about urban design. Bundle up when it's -30! You can see in the photo on the right that some of us were well prepared and others were not. These excursions forced to unplug and engage in relationship building.

Namao Research Vessel. The Lake Winnipeg Research Consortium has a tremendous programme which allows learners to spend a half day on a research boat and investigate the ecology of Lake Winnipeg. This requires a great deal of pump priming and educators need to design several experiences which lead up to this experience. The Namao employs a tremendous amount of technology for the purposes of collecting and analyzing data. A great deal of the technology used on the Namao is analog, but learners also are able to experience how important data collection and analysis are when conducting meaningful and rigorous research that will have an impact on how we mitigate the ecological crisis.

Experimental Lakes Area Student Field Work. Over the past few years, SJR and the IISD have sent learners to the Experimental Lakes Area for two weeks to work side-by-side with world-class scientists in order to learn in a whole ecosystem environment. Learners use a variety of technologies to collect data and develop critical research questions related to human activity on water, climate, and entire ecosystems. In the past two years, the programme has opened up to all learners entering grades 11 and 12. Visit the IISD for more information. Like the Namao, learners used a variety of analogue and digital technologies too develop powerful research questions about how ecosystems are based on networks of complex systems, on the basic principles of the laws of thermodynamics, and on the truth that nature sustains all life. Learners also become highly aware of the value of whole ecosystem research facilities, as they are able to collect decades of data.

Solar Ovens. I love making solar ovens with Grade 9 students as the Science Curriculum fits perfectly with the Social Studies Curriculum. In Science, learners explore energy while in Social Studies, they contemplate how humans use natural resources. Learners can design their own ovens using a variety of software, but then need to get down to actual construction. With a few learning communities we were able to design our own solar ovens and then head to different schools and teach them how to build them. Learners used a variety of applications to create their designs and templates and then used analog tools to construct their ovens. I love it when digital and analog tools come together and allow for deeper thinking and learning based on human existence on this planet.

Mountain Equipment Co-op. This is a must for those educators planning tours of the urban centre. Drop by your local MEC and check out the building, the composting toilets, and the ethical principles by which the Co-op operates. Learners explore what technologies are used to make buildings sustainable and how we can repurpose used resources. This also introduces learners to the notion of co-ops — talk about disequilibrium!

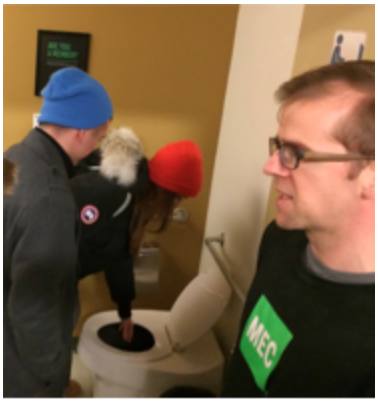

FIGURE 9. LEARNERS EXPLORE THE COMPOSTING TOILETS AT MEC.

Experience

So why such a heavy emphasis on the design of experiences and on the notion of experience itself? The theoretical underpinnings of experience became critical to my teaching criss-crossed with my recent fascination with neuroscience. This collision of worlds stemmed from my annual re-reading of Dewey's *Experience and Education* and Sam Kean's brilliant book entitled *The Tale of the Duelling Neurosurgeons*. (I recommend the annual Dewey exercise, as I continually squeeze out more and more substance with each read.) Neuroscience has become an important part of my practice and design and I have been able to connect with the likes of Jay Roberts who provides the best examination of the experiential education landscape in his book *Beyond Learning by Doing*. The teaching, learning, and application of technology forces educators to become experience designers, as oppose to conduits of knowledge. It is critical that we develop relationships with our learners so that we can find their passion and honour their experience. From there, we can begin to design educative experiences that will lead to

new and existential questions about their purpose and their relationship with other species and systems on Earth.

Conclusion

Given the ecological crisis and the two identified gaps, how can technology help learners and help us foster an ecological literacy? The answer to this question will depend on your style of teaching or your overall pedagogy. But what I offer is that technology can open up the world to learners, connect them with experts and their peers, and allow them to design better ways of living and doing things.

The irony is that much of the technology we use is a great cost to the biosphere and to those who are most vulnerable — perhaps the biggest lesson we can experience with our learners, but the opportunity is to have our learning communities invested in these types of conversations so that we can take meaningful action beyond recycling boxes. According to a report released in part by NASA's Goddard Flight Centre (Ahmed, 2014), the compromise of natural systems will exasperate the "prospect that global industrial civilisation could collapse in coming decades due to unsustainable resource exploitation and increasingly unequal wealth distribution" (para 1). The connection between the learning and application of technology with ecological literacy warrants a larger discussion on the ethical implications of technology. Many of the machines and devices we ask to learners to use come at the expense of some of the most vulnerable people and ecosystems on the planet. Many of the machines we use become obsolete instantaneously and end up in landfills across oceans, leaking toxic waste into soil and water. Every tweet or Google document we ask learners to create consumes a certain amount of energy and therefore an outcome that is generally not accounted for. How do we square this circle? How do we open learners to the power of technology while at the same time engaging them in deep conversations about the impact of the very tools they are using on our planet? This is the paradox of our time, as educators, and may push us to look at modelling technologies that are just, such as they Fairphone. But this seems to be a conversation that educators need to be having as a community. Are we "okay" with exploiting people around the world so that we can have one-to-one iPads in our classrooms? If not, what changes to our curricula are needed and how to we foster citizenship that is participatory and an ecological literacy that is fundamentally based on informed action?

These are big questions for our learning communities as we perpetually examined the purpose of education and our method. Much discussion amongst educators revolves around 21st century learning, maker spaces, and preparing our learners for the coming challenges. Unfortunately, we are not preparing our learners for the ecological crisis which is revealing itself as we speak. Perhaps 21st century skills should revolve around how to create sustainable communities, how to foster an ecological literacy, and how to care for all systems on Earth. This might be a starting place for us all.

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Conclusion

Reynold Redekopp

So what do we conclude from all these amazing stories? It might be that there is no one way to use technology effectively. So much depends on attitude, experience, support, and the actual technology available. We moved from games to GAfE, blogs to songs, robots to humans, K to 12 and beyond, cities to rural, and from Manitoba to around the world. Each contributor found ways to use technology effectively in their unique situation. We saw students creating, communicating, collaborating (and other C's) and generally moving toward becoming responsible, caring, and sharing digital citizens, and we were challenged to think about expanding our definition of literacy and what digital citizenship should look like.

An overriding theme is how the notion of control seems to shift when students are empowered to use technology to accomplish goals they think are worthy. Students gain a sense of independence and the thrill of being part of something bigger than they are. Teachers experience the thrill of students doing the unexpected, reaching out, contributing where they had been reluctant, going above and beyond, and sharing their inspirations in remarkable ways. We need to accept that in some areas of technology students will know more than the teacher, and teachers should take advantage of this dynamic, not hide from it. Rather than avoiding it, it's important to find the pedagogy in this new dynamic relationship.

Most of what we have read in the ebook challenges our ideas of assessment as well. Devin King suggested that student reflection is a critical piece and that while there may not be specific curricular outcomes for some of what students are doing, there is value in the process - and this may be hard to measure or report. Jessica Lister writes about how students find different ways to express their learning and find success. Phil Taylor talks about how the technology makes some assessment easier and definitely helps with organization. Leah and Devon's students did a project that involved specific curricular outcomes, but the learning that was done has more of a 'gestalt' feel to it, and doesn't measure well on formal assessments. And we see example after example in these writings. But again, it is not the technology creating this, it is teachers taking advantage of the technology to create exciting learning opportunities.

At a recent (2015) ManACE (Manitoba Association for Computing Educators) board meeting we had a discussion about the most effective uses of technology in education. We have a pretty diverse group of tech educators around the table but the consensus seemed to be that it was all about communication, communication, communication. The chapters in this book support this notion, each in its own way.

1. Communicating with other classrooms around the world, or virtual guest speakers, or with social media to have conversations with experts, authors, and politicians. (ex. Chapters 2, 6, 7, 8, 9, 15)
2. Communicating with the local community. Classrooms reaching out and a better informed community. (ex. Chapters 1, 4, 6, 10, 11)

3. Communicating with a real audience. Students can now choose to have their work viewed by more than just the teacher. They can create for a larger audience and feel the excitement of products that can go beyond the view of teacher and school. (ex. Chapters 3, 5, 7, 9, 10)
4. Communicating within the classroom. Classroom 'discussions' can now include everyone – even those who are reluctant to speak out loud. We have many, many thoughtful students who don't like to speak publicly. Technology can help them express themselves. (ex. Chapters 1, 3, 5, 12)

These are good ideas and a good start. While we are excited about the direction technology learning is taking, we are also cognizant that there is an inevitable cost associated with the use of technology – not the dollars and cents – but the inevitable gains and losses inherent in adopting certain technologies and their embedded ways of thinking. Technology does not refer simply to the devices we use, but to the way of thinking that is buried deep in the product itself. While we may use some of the devices in creative ways, the underlying process of technology represents a way of thinking. The closest we come to understanding this might be to consider how much we have invested our thinking in the scientific method. It is so embedded that it is almost unfathomable that we would question this process, even when we can see that the process often leads to short terms success and long term disaster. Technology is predicated on efficiency, short-term solutions, linear/procedural thinking, and breaking problems into smaller parts that can be 'solved' and tested, and somehow the 'whole' is never put back together. Technology does not deal with the long-term. But we just accept and believe in it and adamantly defend it.

The other big question to ponder is who benefits the most? The stories we have in this volume describe the amazing, creative ways that amazing teachers have used technology to benefit their students, classrooms, and communities. There are clear advantages revealed in these chapters. In the larger scheme of things however we are probably forced to admit that governments, militaries, organized crime, and large corporations derive the most benefit from technological growth and that there are some terrific trickle down effects to consumers. But current news reports seem to indicate that trickle down economics have only made the rich richer and increased the gap between the very rich and the vast majority of people. Is this the way we want our technologies to go? These questions shouldn't inhibit our use of technology but they should be on our minds, and on our students minds. They can perhaps become part of our classroom research and political discussion. While we need to consider many of these bigger issues of using our devices in education, we must still find optimal ways to use the technology with our students, and the authors in this book have shown us many ways of doing so.

Those are big issues that we all need to ponder, but they shouldn't immobilize us from action; from finding good ways to use our technology in education. Now, especially for those who are relatively new to technology use in the classroom, it is critical to recognize that all of these writers began somewhere. They did not become fully 'infused' technology-using teacher overnight. They started small and tried an idea and then built on their successes and failures. They learned from the process and from their students. If you are new to using technology in your classroom, take heart in that and perhaps find one way in which technology can create better learning or better expression of learning. We can all learn from the writers you find here. If you are already a technology using educator, then grab an idea from this book and run with it. Keep on learning and keep on improving your teaching craft.