A Case Study of the Launch of a Blended Learning Program Using Tablets to Teach Mechanical Engineering Students

by

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Table of Contents

The launch of a blended learning program using tablets

Abstract

The combination of an interactive web and mobile technology is facilitating a change in teaching strategy in which online and face-to-face teaching methods are being integrated in post-secondary classrooms. Literature identifies the approach as blended learning or sometimes as a hybrid course or flipped class. This paper presents a case study that sought to answer the question - how were teaching and learning perceived to be impacted by the choice of technology and the launch of a blended learning approach. Students in a mechanical engineering technician program at a community college in Ontario were given tablets to access a learning management system while faculty launched a blended learning approach. Faculty interviews, a student survey and a student focus group were used to find out how the teachers structured and managed the face-to-face and online components of the program and how the students responded. The case study findings appear to be consistent in a number of areas with the literature, including the definition of blended learning; the concerns around faculty comfort, training, and on-going support to use technology; the central role of a learning management system in a blended class; and the perceived lack of student motivation among less mature students to be responsible learners. Faculty and students questioned the choice of technology while faculty raised questions about students' learning styles, in particular kinesthetic, and what topics or subject areas are best suited for online and face-to-face instruction. The need for student orientation to include the reason behind the changes students will experience in the classroom is suggested. A question is raised about the timing of implementing a blended learning program and whether it should be deferred to the second semester or year of a post-secondary program. These areas are recommended for further study.

The Launch of a Blended Learning Program Using Tablets

Chapter 1

Introduction

As long as the profession of teaching has existed, technological advances have challenged and shaped it. Often the changes have been slow and incremental. Sometimes they have enhanced what is already happening in the classroom, and sometimes they have enabled changes in pedagogy. Intertwined with these changes introduced by tools that teachers must learn to use and then incorporate into their lesson planning, are the needs, expectations and sometimes advanced technical skills of their students.

In the Beginning

Consider the Greek philosopher Socrates, who lived between 469 and 399 BCE. He taught in the oral tradition of the time. There were no written notes or handouts, and students were expected to listen, reflect, question and learn. It was his student, Plato, who recorded Socrates' words, and what follows is his record of what Socrates said about the new device, writing:

> "In fact, it will introduce forgetfulness into the soul of those who learn it; they will not practice using their memory because they will put their trust in writing, which is external and depends on signs that belong to others, instead of trying to remember from the inside, completely on their own. You have not discovered a potion for remembering, but for reminding; you provide your students with the appearance of wisdom, not with its reality. Your invention will enable them to hear many things without being properly taught, and they will imagine that they have come to know much while for the most part they will know nothing (Plato, n.d., p. 551-552).

Writing was arguably one of the earliest technologies to impact teaching, and Plato was perhaps arguably the first student to challenge his teacher with a new device! Writing was an

invention that fundamentally changed society, and it was clearly an advancement that educators could not ignore, despite Socrates' concerns.

Current technological impacts on education

Fast forward some 2,400 years and the technological devices that are changing our society continue to impact the education system in both small and significant ways. Many students arriving at post-secondary school today have never lived in a world without instant access to the Internet and World Wide Web. Their apparent ease with technology often surpasses their teachers' comfort levels. Faculty continues to grapple with what of these latest tools will enhance learning and what will distract, complicate or detract from learning.

The concern is not misplaced when we consider how the use of technology has struck at the heart of education's basics, 'reading, writing and arithmetic'. The debate about the use of slide rulers and calculators in mathematics classes has echoed in school hallways for many years. As recently as 2008, *Science Daily* reported on the use of calculators, approving of them once students have learned some basic skills (para. 1). More recent technical advances are being studied in the areas of reading and writing. Many post-secondary bookstores offer students e-textbooks, possibly an appealing option for students who were raised reading and interacting with screens. However, a research study (cf. Li, 2012; Szalavitz, 2012) in the U.K. that compared students who used e-books with students who were provided a hard copy of the textbook suggested that hardcover textbooks might be more beneficial than e-books for digesting information. Their study found more repetition was needed with screen reading to reach the same level of knowing as those who were reading paper. As for writing, some elementary schools are beginning to drop cursive writing from their curriculum in favour of keyboarding skills; yet

cursive writing may be advantageous to memory when compared to writing with a computer. The blog Softpedia reported "people who use a pen and paper to write down information tend to remember it a lot easier than if they type it on a computer keyboard or touchscreen" (Vieru, 2011, para. 1). *Psychology Today* cited studies that have suggested "learning cursive is an important tool for cognitive development...multiple areas of the brain become co-activated during learning of cursive writing of pseudo-letters, as opposed to typing or just visual practice" (Klemm, 2013, para. 4).

The debate and research concerning the value of traditions such as textbooks, cursive writing, and math calculation skills versus using technology will no doubt continue. Only time will tell if we are challenged by these changes because we naturally resist anything that moves us from the familiar to the unfamiliar, or if the changes are in fact detrimental to learning, or if we will eventually adapt to learning in new ways. Something is often lost when we exchange old for new, technology frequently comes with a trade off (Kruse, 2012), but the question is whether what is gained is worth the loss. It could be argued that being able to write information down on paper does rob us of using our memory, as Socrates warned, but where would our world be without that particular technology?

A Teacher's Quest

My quest as a professor at Conestoga College in Kitchener is no different than others – how can I improve the learning experience for my post-secondary students?

College students include a broad range of ages and life stages, from 17-year-old recent high school graduates to adults returning to school for a second career. The classes are usually a

mix of ages, life experiences and maturity levels, and they can include a combination of recent high school graduates, university graduates, and college graduates. College programs are typically focused on preparing students to work in specific careers or industries. Ontario colleges are mandated to award 2, 3 and 4-year program diplomas, and in some cases applied degrees, as well as post-graduate certificates in a variety of fields.

I teach into programs that prepare students to work in the communications field as public relations practitioners or marketing communications professionals. One of my students, after being told several times to turn off his mobile phone in class, told me that I should be using his phone to teach him. While I maintained the 'all phones off' rule in the classroom where I was giving traditional lectures, his comment has stayed with me. Was there another way to reach his generation? How could I – indeed, should I - tap into the new technologies that I see my students bringing into the classroom? My concern is not just an issue of using social media and mobile devices to reach and engage a younger, possibly more tech-savvy crowd. These new tools and ways of communicating are changing how business communicates and markets itself. I need to role model the use of relevant technologies that my profession is embracing, but I also respect pedagogical concerns.

Research revealed technological trends that are empowering a significant change in the way teaching takes place, called by a few names: blended learning, hybrid courses, or the flipped classroom. Mobile devices and Web 2.0 – the interactive use of the Internet - are enabling the changes and millennial students, born after the birth of the Internet, often play a key role in driving this new approach. With this approach, teachers deliver course content through the use of both online and face-to-face classroom strategies. It is not distance education, but it combines

traditional face-to-face classroom experience with computer-mediated instruction. Time spent with students in the classroom is changed and what the student is doing outside the classroom also changes. Furthermore, the teacher is only one source of information - students are encouraged to source content from online as well.

There is no question that the new technologies of the Internet and multimedia that are emerging in the 21st century are fundamentally changing the learning environment (Bates, 2000). Could these changes be as significant as the invention of writing? Dede (2008) has posited that the new technologies are "redefining what and how and with whom we learn" (p. 80). Dede pointed to Web 2.0 technology, including such sites as Wikipedia, where there is a "shift from the presentation of material by website providers to the active co-construction of resources by communities of contributors" (Dede, 2008, p.80). This is how students entering post-secondary school now understand technology and it "has important implications for learning and education" (p.80).

The *Chronicle of Higher Education* reported in February 2013 that tablet computing, along with massively open online courses (MOOCs) topped technology trends in education. "MOOCs and tablet computing are both expected to enter mainstream use within the next year" (New, 2013, para. 3). Ken Steele, a co-founder of Academica, a think-tank and research organization that follows trends in higher education, called blended learning the number one opportunity for post-secondary education (Steele, 2013a).

There is a significant transition taking place in the classroom, and it may be difficult for faculty to determine what of the traditional classroom should stay and what should be replaced with new technology (Palfrey & Gasser, 2008).

Thus, I sought an opportunity to study a blended learning program at a college in another community that would create an arms-length research project and the chance to see this approach in action with students similar in make-up to my own.

Case Study

I found the opportunity to study the launch of a blended learning program while attending a regional conference for community colleges in May of 2012. I met a group of faculty from Mohawk College who were planning to give tablets to their mechanical engineering students and launch a blended learning approach starting with the fall semester. Their pilot would provide me with an opportunity to conduct a case study. Although they teach in a different program area than I do, their experience would be relevant. Their students, like mine, have a mix of backgrounds. Also like me, the faculty was using a mix of traditional lectures, group projects, and experiential learning to prepare their students to pursue a career in a field that has been impacted by technology. They would be using Desire2Learn, the learning management system (LMS) my own college would soon be adopting.

The students in the program would use the tablet to access the LMS in a blended learning environment. The ultimate goal of the pilot was to reduce face-to-face (F2F) class time between faculty and students by as much as 30 per cent, creating fewer hours in the classroom and replacing that time with online instruction.

The pilot paved the way to ask the question 'how are teaching and learning perceived to be impacted' by the choice of technology in the launch of a blended learning environment? Research would explore how faculty structured and managed the face-to-face and online

components of the program and how students responded. How did the choice of tablet benefit or detract from the change in approach to teaching? What role did the learning management system (LMS) play?

It would not be the first blended learning program at Mohawk College where talk of blending online with face-to-face instruction began around 2010. The college's goal now is that 30 per cent of all face-to-face class time will be moved online for the January 2014 semester. The reduction in face-to-face time will occur in the portion of any course that is taught in a regular classroom as opposed to a shop where hands-on practical components are taught and experienced by the students. The classes in the mechanical engineering technician program are typically 50 per cent classroom and 50 per cent shop; online instruction would replace 30 per cent of the 50 per cent classroom time (or 15 per cent of the total instructional time in the program).

For the pilot, each of the 60 students enrolled in the first year of the mechanical engineering program was provided with an iPad. The college had recently purchased Desire2Learn (2013) and mandated its use, thus, the six program instructors were already familiar with this learning management system. They used it to post lecture notes, class presentation slides or assignments, and they used the built-in tools for quizzes, discussion boards and live chats. Using the tablet in the classroom or to access the online materials would be new for the teachers and possibly new for their students. A blended learning approach where class time would be reduced was also new to some of the teachers involved, and it would likely be a new approach to learning for most, if not all, of the students.

The mechanical engineering technician program is a two-year program or a three-year program including a co-op option. The co-op option includes a four-month co-op between semester two and three and then a 12-month co-op between semester three and four. Students graduate with a technician diploma (co-op option after three years), and they are signed as a Millwright Apprentice (433A), with the Ministry of Training, Colleges and Universities (MTCU). The jobs the graduates enter include any area that has equipment that needs to be manufactured, installed, maintained or repaired. It is very typically automated companies and they vary anywhere from the food industry to the steel industry.

Many of the jobs in the industry take place in a shop or manufacturing environment with hands-on tasks involving tools and machinery. While these tactile skills are important in the trade, critical thinking is also required to troubleshoot complex mechanical issues. The students who are attracted to the program are more likely kinesthetic learners who might prefer a hands-on approach to their education. Some come directly from high school and some have returned to school after working for a while. The program also attracts students from university with an engineering or science degree who are looking for practical skills to find work.

The ultimate educational goal would be to earn a Red Seal that certifies the recipient as a millwright journeyman allowing them to work anywhere in Canada. The exam, which is administered by Ministry of Training, Colleges and Universities, can only be written after some 9,000 hours of fieldwork, and a 70 per cent pass is required.

I requested and was given permission to follow the experience of faculty and students in the first year of the mechanical engineering technician program. In order to answer the question, how were teaching and learning perceived to be impacted by the choice of technology and a

blended learning approach, a case study approach was designed, using faculty interviews, a student survey and a student focus group.

Chapter 2

Literature Review

This literature review first looks at research that describes the scope of change in classrooms that mobile technology and accessible, interactive programs are supporting. It then examines the definitions of terms used to describe the approach to integrate online and face-to-face classroom instruction, followed by a review of some of the relevant theories around innovative instructional methods that may be underlying the approach. The review then looks at why schools decide to integrate technology with face-to-face (F2F), what issues are related to the use of technology, how does faculty perceive and apply the new approach, and how has student learning and interaction been impacted.

Scope

The latest trend to integrate online instruction with face-to-face classroom lessons is being spurred on by the continuing growth and development of accessible, interactive programs such as blogs and wikis, and mobile hardware such as tablets. Changes in teaching methods are moving the use of technology in the classroom to what Donna Rogers (2000) identified as the third level of technology adoption. Rogers defined the first level as using technology, such as a word processor to make a task easier, as "personal productivity aids;" the second level would see a teacher using technology to enhance the classroom, such as use of video, "without changing the basic mode of instruction." She called the third level a "paradigm shift," where teachers and schools would "reconfigure teaching and learning" (p.21). Today we see technology integrating "computer-mediated instructional elements into the traditional F2F (face-to-face) learning experience" (Graham, 2004) often with an accompanying reduction in seat-time in the

classroom. It is an approach that goes beyond the use of technology to "enhance" (D.Rogers, 2000, p.21) the classroom, and instead, integrates with classroom instruction changing how teachers teach and how students learn.

Researchers who have looked at the integration of online and face-to-face strategies for over a decade suggest that in the schools where this approach is happening, "the change is of sufficient magnitude to be described as an educational transformation or paradigm shift" (Dziuban, Hartman & Moskal, 2004, p. 2).

Definitions

The move to mix online instruction with F2F instruction is accomplished in a variety of ways and there are a variety of methods described in the literature: blended learning, hybrid classes and the flipped classroom.

Blended learning. Graham (2004) noted that while some literature defines blended learning as combining instructional media or as combining instructional methods, "one would be hard pressed to find any learning system that did not involve multiple instructional methods and multiple delivery media" and thus he posited that the definition of "combining online and face-to-face (F2F) instruction" is the most accurate description of blended learning. Researchers at the University of Central Florida (UCF) who have studied the integration of online and F2F instruction for a number of years might concur with Graham's definition. UCF first considered blended courses in 1996 when it was discovered that "more than 75 per cent of students enrolled in our initial fully online 'distance learning' courses were also enrolled in on-campus face-to-face sections" (Dziuban, et al., 2004, p.4). In their report on blended learning, the authors noted that

UCF recognizes that instruction happens "on a continuum" from fully face-to-face interactions to fully online instruction with the middle ground given to "web-enhanced courses (face-to-face courses that make pedagogically significant use of the Web through a course management system but do not reduce seat time) and blended courses that combine face-to-face and online instruction with reduced seat time" (p.2). They believed the reduced seat time is an "important distinction" in blended learning because a course can incorporate online instruction but not reduce face-to-face time between faculty and students.

This would echo what Clark (2011) noted in her literature review, that according to the University of Manitoba, "blended delivery is not:

> • a conventional f2f (face-to-face) lecture based class, where the PowerPoint slides used for the lectures or course notes are put online,
>
> • a conventional f2f lecture or seminar based course in which online discussions are enabled as an option for students. The discussions are not assessed nor do they replace any f2f activity,
>
> • a conventional f2f lecture based class, where all assignments (e.g. papers) and tests (e.g. multiple auto-marked quizzes or exams) are completed and submitted online, or
>
> • a course that is offered completely online but the final exam is f2f at a specific location at a specific time (p.9).

Some of the literature attempts to define the specific percentage of instruction that is online versus F2F, such as "30 to 79 percent" (Allen, Seaman & Garrett, 2007, p.5). In the state of Indiana, legislation now requires "at least 51 per cent of the instruction in charter schools to be delivered in a face-to-face setting" (Watson, n.d., p.10). There are many factors, such as course goals, instructor experience and student profiles that will influence what and how much of a

specific course will go online; however, the influences are so many that "there is no defined standard as to how much or what part of courses go online and it varies widely" (Dziuban, Moskal, & Hartman, n.d., p.4).

Hybrid. Hybrid courses are described as "courses in which a significant portion of the learning activities have been moved online, and time traditionally spent in the classroom is reduced but not eliminated" (Garnham & Kaleta, 2002, para. 1). Tabor (2007) referred to "the hybrid or blended model" (p.48) in her paper about a pilot project in the Information Security program she taught at Boise State University. Clark (2011) agreed that the blended and hybrid terms are "generally used interchangeably" (p.8). The literature appears to recognize the terms blended or hybrid as defining an approach to teaching in which online instruction replaces a portion of the F2F time spent with an instructor in a classroom. Albrecht (2006) wrote of the debate over the definition of blended and hybrid learning and noted "at this writing, preponderance of practice favors a description of bringing together face-to-face classroom instruction with Web-based activity in which classroom time is partially replaced by the Web-based work" (p.2).

Flipped classroom. In their book *Flip your Classroom: Reach Every Student, in Every Class Every Day*, Bergmann & Sams (2012) discussed how they pioneered what came to be known as the flipped classroom in their high school chemistry courses in 2007. They used videos to deliver content that students accessed on the teachers' websites as homework and used their class time for assignments, testing, and experiments giving teachers more time to address individual student concerns. They did not reduce class time but instead used class time differently. They launched the approach, in part, because they realized that their students needed

them the most when they were trying to apply the lesson in assignments at home. Technology enabled them to put the lesson online and then respond to assignment questions in class instead.

The Flipped Class Manifest described the flipped classroom as the "active and intentional transfer of some of the information delivery to outside of the classroom with the goal of freeing up time to make better use of the face-to-face interaction in school" (Bennett et al., 2012, para. 8). Although there is no specific mention of reducing F2F time, the authors did note that there are no prescribed rules to follow and each flipped classroom will look different, depending on how the teacher organizes the class. They noted that flipping "overlaps" with other approaches including blended learning.

Definition summary. It is also possible that eventually a definition for blended will be unnecessary; in his review of several schools where a variety of blended programs were implemented, Watson (n.d.) noted "there is no single type of blended education...experience and data will provide guidelines, but absolutes will be hard to find" (p.14). Graham (2004) posited that due to the increasing role of technology in education and the growth of schools that implement its use into regular practice, "it may even become so ubiquitous that we will eventually drop the word ‘blended’ and just call it learning" (p.6).

This paper will use the term blended learning to describe an approach to teaching in which technology is used to facilitate a reduction in student-teacher F2F time in the classroom.

Possible Factors

Understanding the theories that may be behind innovative instructional approaches allows faculty to think critically about the factors that may explain how what they are doing in the classroom impacts student learning.

Diffusion of innovations theory. Before looking at theories that may partly explain the success of blended learning, it is helpful to review a theory behind the adoption of any new innovation. This can help to explain the adoption process and what may need to happen to continue adoption. The Diffusion of Innovations theory (Rogers & Shoemaker, 1971, p. 184-185) describes five adopter categories: innovators, early adopters, early majority, late majority and laggards. Innovators are "eager to try new ideas" and are risk takers. They will move forward with a new idea well before anyone else. Early adopters are leaders who others look to "for advice and information about the innovation." The early adopter is "respected by his peers," and he will be asked to share what he knows. The early majority are among the first half to adopt an innovation. Their adoption is an "important link in the diffusion process" (because while they do not lead, they do) "interact frequently with their peers." The late majority are next to adopt and they do so with skepticism and not "until most others in their social system have done so." Laggards are the last to adopt an innovation and by the time they do "it may already have been superseded by another more recent idea which the innovators are already using." According to Rogers' theory, people will adopt an innovation depending on their awareness, interest, evaluation, trial and adoption of the innovation. As early adopters share and early majority adopters interact with peers, the Diffusion of Innovations theory suggests that awareness of blended learning would grow. As time moves on, teachers who have not implemented an

innovation may be either late majority adopters or laggards. At these stages, Hartman, Dziuban, & Brophy-Ellison (2007) suggested that faculty will become "less likely to adopt an innovation" (and be) more entrenched in traditional beliefs and practices" (p.70). Other factors then become important in adoption, such as "economic necessity... and social pressures" (Rogers & Shoemaker, 1971, p. 184) that may convince the skeptical late majority. In another section of this literature review, administrative pressures around the needs of working students and cost containment are noted, and these may become more important to the adoption process as time moves on.

Variation theory. Oliver & Trigwell (2005) linked the term, blended learning, to variation theory, as a way to explain reports of improvements in student learning. Variation theory suggests, "for learning to occur, variation must be experienced by the learner. Without variation, there is no discernment and without discernment, there is no learning" (p.22). Simply put, if we did not know what cold was, then we would not understand warm. The authors suggested that variation may also be experienced when a student is exposed to an idea through a book, a video and a field trip, for instance. Accessing or being exposed to information in different forms, through different media, or from different sources is variation. It may explain why teachers often find that a guest speaker, who delivers the same message in the same format as the teacher, can sometimes have a greater impact on the class. Thus, "it is also possible that the use of several teaching media may help students experience these patterns (of variation) and this may also be occurring in some blended learning contexts" (p.23). In a blended class, students may be exposed to content online through reading materials, a multi-media source such as video, a class blog, peers in an online discussion board, and then they may be exposed to it again during F2F discussions with the professor in class. Oliver & Trigwell (2005) suggested

that new technologies may bring about new patterns of variation not possible before which "may make it easier to help students experience the variation in the critical aspects of the topic being learnt" (p.23). Blended learning offers the potential for a teacher to use different instructional methods.

Novelty and Hawthorn theories. Oliver & Trigwell (2005) also noted two other factors that may be at play in the recorded improvements in student learning. The novelty factor, or being exposed to something new, can improve student success for a while, but these gains "tend to diminish as students become more familiar with the new medium" (Clark, 1983, p.450). The Hawthorn effect (Del Balso & Lewis, 2005) occurs when people are aware they are participating in a study and that heightened awareness can impact results. Such participants might consciously try to answer 'correctly', or what they perceive the researcher is looking for, for instance. They may not respond as they would under normal circumstances. Oliver & Trigwell (2005) suggested years of research will be required to determine if the blended approach improves learning, or if other factors are at play.

CANE theory. Dziuban et al. (n.d.) from the University of Central Florida (UCF) suggested a hypothesis to explain their surprising results that suggest millennial students, born between 1981 and 1994 and often considered the most technologically savvy, would not be the most satisfied with blended learning. They quoted Richard Clark's (1998) work on motivation; the CANE model stands for commitment and necessary effort and is based on three components: 1. Personal agency or can I do this, 2. Emotion or do I feel like doing this, and 3. Task value or will this do me any good, is it important to me. The CANE model suggests that only one component needs to be zero or negative for commitment to be negatively impacted. Dziuban et

al. (n.d.) suggested that the emotion and task values are important to understanding millennials; if they just do not feel like doing it and do not think it is important, their commitment will be low. While this could also be the case for any other group, the authors noted in their description of millennials, "media exposure has taught these young people to challenge any tradition, institution, value or person they choose" (p. 3). Thus, they may more readily challenge and question the approach. Satisfying their need for access to media may not be enough. The CANE model also predicts that when personal agency, or ability, is very high, effort will decrease; most millennials come to class with a high ability with technology, in many cases higher than previous generations, and this may explain why they do not feel like engaging or why they do not think engaging will be important to them. In the end, that may result in their being less satisfied with the approach. The theory suggests that older students who may have less technical ability, but bring a positive desire to engage and a belief that engaging will lead to something better, will score higher on satisfaction levels.

Pedagogy

Pedagogy refers to the decisions a teacher makes in determining how to teach course material. Mirriam-Webster defines it as the “art, science or profession of teaching” (2013). Research has looked at how blended learning can facilitate individualized learning plans, how the approach is perceived in different subject areas, and blended learning’s support of student-centred learning.

Differentiated instruction. Albrecht (2006) noted that with blended learning, education is "moving away from the single delivery system that inevitably favors one segment of any student population" (p.5). He quoted Harvard Professor Chris Dede that "well-designed learning

experiences using several instructional media with differing characteristics... enable all students to utilize their most effective ways of learning" (as quoted by Albrecht, 2006, p.5). Albrecht also quoted Ron Bleed, retired CIO of The Maricopa Community College District where blended learning was successfully introduced; "the 16-week, fixed-seat time course is the biggest barrier to student success" (2006, p.6).

Watson (n.d.) reported on the VOISE Academy in Chicago where F2F instruction is blended with fully online curriculum that is accessible 24/7 and students work at their own pace. The school's manager of distance learning noted, "Teachers are expected to do differentiated instruction in the traditional classroom which is difficult, if not impossible to fully achieve due to time constraints. In a blended model, teachers actually have the time and opportunity to work one-on-one with students and achieve real differentiated instruction" (as quoted by Watson, n.d., p.12).

The ability of a student to manage the pace of his or her learning is repeated often in research and suggests the approach could open the way for more individualized learning pathways. It is the ultimate in flipping a classroom that Bergmann & Sams (2012) called the Mastery Model in their book. An observer to their high school classroom would see "asynchronous activity. Basically all students working are working on different activities at different times" (p.53); the students will even be at different points in the course requirements.

Best subject areas for blending. Finding the right balance between online and F2F is key to a successful blended learning experience, and it may not suit all subject areas. There are many examples of different arrangements that were highlighted in Watson's (n.d.) report. At the Hoosier Academy in Indianna, just over half of all instruction is F2F. At Odyssey Charter

Schools in Nevada students access the fully online curriculum with required on-site attendance one day a week for four hours to receive F2F instruction and mentoring. They have found the F2F component more important in subjects like math. The one required course at this school is Learning Strategies and it is taught 50 per cent F2F. Commonwealth Connections Academy uses F2F for students it has identified as needing extra help. In Tabor's (2007) study of the information security class, in-class sessions covered the technical content, outside speakers, demonstrations, and hands-on labs while the online materials were more conceptual or included lab preparation. The intent of Cottrell & Robison's (2003) study of the blended accounting course was to use class time for discussions that would require more critical thinking and to leave the technical review online. Snowden (2012) noted that flipping the class was seen more positively by those teachers in lecture-based classes versus those who wanted to use F2F class time for critical thinking discussions.

Socialization and active learning. Dziuban et al. stated in their 2004 report on blended learning that it "should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities," but with the following characteristics:

> • A shift from lecture to student-centred instruction in which students become active and interactive learners (this shift should apply to the entire course, including the face-to-face contact sessions).
>
> • Increases in interaction between student-instructor, student-student, student-content and student-outside resources.
>
> • Integrated formative and summative assessment mechanisms for students and instructor (p.3).

Reasons for Implementing Blended Learning

Incorporating technology into the post-secondary classroom could be viewed as a response to what is happening in the classroom anyway. Digital natives, a term used to describe students who were born after the Internet, are changing the classroom (Bates, 2000). Hartman et al. (2007) noted that students who have grown up with the Internet and the access it gives them to whatever they want to know are changing the classroom because "learning opportunities outside the classroom may far exceed those within" (p. 66). In fact, they may see the classroom as redundant. This fits with the goal of blended learning which is to reduce time in the classroom and to direct students to access resources online, including resources posted by the teacher as well as those that can be found from other sources. However, it may also be a mistake to assume digital natives will automatically prefer or do better in a blended environment and this is addressed more below.

The most common reasons for implementing blended learning in the literature were centred on student success and administrative benefits.

Student success. Student success, engagement, retention and access are cited in many studies as reasons for implementing blended learning. In a pilot that tested blended instruction in a larger class at a college of education, teachers wanted "to improve student participation, preparation, and understanding as well as to encourage a more active rather than passive approach to learning" (Kenney & Newcombe, n.d., p.45). Reluctant learners may be more inclined to participate online rather than in a F2F situation (Clark, 2011). Many post secondary learners are returning to school for a career change and the online portion of the program can be more accessible and more easily juggled with home, family and job responsibilities (Dziuban et

al., n.d.). There is increased interaction between faculty and students because the approach requires active learning (Garnham & Kalata, 2002). Studies also point to better attrition rates than what is seen in fully online courses and, sometimes, it is better than F2F (Dziuban et al., 2004). Time management skills and computer skills are needed by students to be successful in school and these are developed in a blended environment (Clark, 2011). Dzuiban et al., (n.d.) also point to the value that computer literacy skills have for the students' future careers. As well as older students and reluctant learners, classes with mixed levels of student aptitude have been noted to benefit from blended learning. In another study, a blended learning approach was implemented to "compensate" for varying levels of student aptitude in the subject being taught: "students can learn at their own speed, and this tool reduces the need to ask questions of the professor" (Cottrell & Robison, 2003, p.263). The authors also suggested this enhances the teaching efficiency of instructors. In another study, it was noted "students grow progressively restless during periods of direct instruction," time that could be better spent, argued the authors, on "hands-on practice" (O'Bannon, Lubke, Beard & Britt, 2011, p.1887).

Administrative benefits. While most studies that looked at blended learning stress enhanced student engagement and achievement for reasons to implement, they also note administrative benefits. Dziuban et al. (2004) report that "top level administrators see the demand for more flexible learning opportunities in the communities they serve and can respond to these needs with blended learning initiatives...to a wider constituency than formerly possible" (p.10) using the space freed up by other blended programs. In a presentation to college faculty, Steele (2013a) shared a forecast that suggests the labour force deficit will reach four million by 2031. The impact for education is that there will be an increase in both part-time and full-time

students who continue to work while going to school, and these students will seek more creative ways of obtaining their education.

Cost savings. On one hand, cost savings is a potential benefit for administrators. Clark (2011) included "address funding challenges" (p.10) as one of the reasons to implement blended learning. It is an area of concern to post secondary institutions that are managing on shrinking government dollars and responding to the pressure not to increase student tuition fees. When F2F time is reduced, classrooms are available in facilities where space is at a premium; the need for parking spaces is also reduced (Dziuban et al., 2004) when a portion of the student body is at home on the computer rather than in the classroom. Dziuban et al (2004) described a blended learning design that aggregated three sections of a medium-enrolment course into a single section with "one-third of the students attending a Monday, Wednesday or Friday face-to-face class and all students participating in a well-designed online environment" (p.3); the direct instructional costs were reduced by "25 to 50 percent" (p.3).

Development and training expenses. However, the lure of cost savings comes with some cautions. Potential savings would need to be balanced against costs associated with the development of courses and the technological support required for online teaching and learning. In his report for EDUCAUSE, Albrecht (2006) noted that training faculty to use technology and the "redesign of lectures into Web-based activity, for example, consume a great deal of time" (p.7).

Public relations. Albrecht also suggested that a challenge for administrators is how to explain fewer hours in the classroom to the public. Watson (n.d.) reported a similar concern at

the VOISE Academy in Chicago where it has been challenged to communicate, "how the instructional model works and the value it brings to the educational experience" (p.12).

Technology

A decision to integrate online and F2F instruction requires significant use of technology. A learning management system that all students can access to obtain course outlines, assignment details, course notes or slides from instructors and their grades is key. These systems often include the framework for faculty to set up live chats, discussion forums, and automatically graded quizzes. Watson (n.d.) concluded after his review of several blended programs that a learning management system that "organizes the course may, in fact, be a distinguishing characteristic between a truly blended course and a face-to-face course that simply incorporates a few digital elements" (p.14).

Tabor (2007) cautioned against overuse of media: "The same media richness that makes the online world interesting can also lead to overuse. Hybrid courses can readily grow to become a class and a half worth of content that leaves the student overwhelmed and unclear about focus" (p.50).

A debate about whether technology can be credited with improving student learning is reflected in the research. In 1983 Clark contended, “it was not the medium that caused the change, but rather a curricular reform that accompanied the change” (p.445). A decade later, in 1994, he maintained “media and their attributes have important influences on the cost or speed of learning but only the use of adequate instruction methods will influence learning” (Clark, 1994, p.27). However, Kozma (1994) challenged Clark’s attempt to separate the media from method:

"in good designs, a medium's capabilities enable methods and the methods that are used take advantage of these capabilities. If media are going to influence learning, method must be confounded with medium. Media must be designed to give us powerful new methods and our methods must take appropriate advantage of a medium's capabilities (p.16).

Other studies have looked at specific technologies and how they impacted student achievement. A few of these included the use of Facebook by undergraduate students at a university (Selwyn, 2009); the use of a tablet by faculty to provide feedback in online classes (Steinweg, Williams, & Hopfengardner, 2006); the use of podcasts at a university (Vajoczki, Watt, Marquis & Holshausen, 2010); and the use of wikis in the classroom (Green & Maxwell, 2010).

Ensuring that both faculty and students are knowledgeable and prepared to use the technology is integral to a successful blended program. Faculty motivation and need for training as well as the assumptions about tech-savvy students are reviewed here.

Faculty motivation to use technology. Many studies have delved into the motivations of why teachers use or don't use technology. These have included research into organizational culture (Adamy & Heinecke, 2005); faculty fears of looking incompetent (Brown, Benson & Uhde, 2004); faculty time to learn and implement new technology (Brzycki & Dudt, 2005); and entrenched traditional beliefs and practices (Hartman et al., 2007). In 2001, Zhao & Cziko argued that when technology will help a teacher achieve his or her goals, then it is more likely to be adopted. Donna Rogers concluded in 2000 that faculty resists adopting technology when they are not convinced it will improve student learning.

Faculty professional development. Providing the necessary support so that faculty can try and evaluate an innovation is important to its success. Kahler (n.d.) posited that faculty need "time and opportunity to play, that is to practice" (p.59) new technology while Brown et al. (2004) suggested time must be provided in order for faculty "to remain proficient after the initial instructional period" (p.103). In his article about using iPads in school, Gliksman (2013) wrote effective training means "time for ongoing training throughout the year" (p.8) and not just a "half-day workshop" at the beginning of the school year. Other research into the factors that support faculty adoption of technology suggests that training may be the weak link and that it must specifically "go beyond teaching technology skills to include teaching faculty to understand the learning style of students" (D. Rogers, 2000, p.22).

At UCF, Dziuban et al. (2004) explained there is a high level of support that assists faculty in transforming their courses to blended offerings. They reported 88 percent of faculty is satisfied with the change while five percent is unsatisfied and seven percent is neutral. Tabor (2007) shared the approach to prepare faculty that was used at Ohio University where bright information service (IS) students were assigned to become experts on specific software, and then they taught faculty how to use the tools.

Students and technology. The student perspective, particularly of those born after the Internet, has been looked at extensively: (cf. Gabriel, Wiebe & MacDonald, n.d.; McGee & Diaz, 2007; Hartman et al., 2007; Palfrey & Gasser, 2008; Dede, 2008; Dziuban, et al., n.d.). Dziuban et al's. (n.d.) assessment of the generations that mix in many post-secondary classrooms is revealing. Matures (born prior to 1946) and baby boomers (born 1946-1964) tend to believe a post-secondary education will result in a better life. Generation X (born 1965-1980) may be

uncertain of what will happen after graduation while millennials (born 1981-1994) are likely interested in putting their own education together from different sources. While the individual members in each of these groups can differ significantly from these descriptors, the terms are helpful here to generally describe the characteristics that may impact classroom dynamics. The millennial preference to create their own curriculum might bode well when this student is in a class where the teacher expects the students to gather content from more sources, both offline and online, than just the teacher in the classroom. Tabor's (2007) student survey suggested the students wanted audio files so they could listen to them away from the computer, in their car, for instance, while commuting.

Assumptions about student's technical savvy. The millennials' exposure to new technology development would seem unprecedented but Kumar (2010) made the point that due to the rapid evolution of technology, it can be difficult to make comparisons about student awareness or comfort using a particular technology across an age group as they may have been exposed to different technologies at different times. Even if students are able to show their professors how the technology works, the information they access through it comes either with no context or too much and the challenge for teachers "is to help them make sense of these new contexts ...and to think synthetically and critically (Palfrey & Gasser, 2008, p.253).

Faculty should not assume a younger generation that was possibly raised on the Internet would be automatically satisfied blended learners because of the online component. Some students may be familiar with different technologies, including social media, but much of their use would be confined to their personal lives, and not necessarily in an educational or workplace context. Faculty needs to remember students are still young with a limited life experience,

despite their technical abilities. Dzuiban et al. (2004) from UCF found that millennial students were the least satisfied with blended learning. They cautioned: "If older generation faculty confuse the millennials' extensive technological sophistication with maturity, the faculty may forget that many of these new learners are still adolescents" (p.13).

The myth of student multi-tasking. The idea that this exposure to a wide array of technology means they can multi-task like no generation before could also be more perception than reality. A Stanford University study determined that "People who are regularly bombarded with several streams of electronic information do not pay attention, control their memory or switch from one job to another as well as those who prefer to complete one task at a time" (Gorlick, 2009, p.1). In fact, Dziuban et al. (n.d.) reported that millennials "can complete a task, listen to the portable CD player, and talk on the cell phone simultaneously, but employers report that their basic skill levels, critical thinking ability, and initiative are developmentally lacking" (p. 4).

***Technology orientation for students*.** Despite the apparent savvy with technology, students should be provided a thorough orientation to the technology that will be used in a blended program. In a University of Wisconsin study, Aycock, Garnham, & Kaleta (2002) found that "all participating instructors agreed that the first week of class should be dedicated to technology and class socialization" (p.5) rather than getting into course content. This would prepare the students to use the technology and allow them to get to know each other. Students in this study believed that learning how to use the technology would benefit them in other courses and in the workplace.

Faculty Perspective of Blended Learning

The review found many studies that looked at blended learning and the opinions of teachers who described the changing role of the teacher, the increased workload to implement and manage a blended course, the enhanced engagement and success of students, and concerns about maintaining relationships with students.

Changing role. Adopting a blended learning approach to lesson planning will mean that teachers will become "guides and mentors instead of purveyors of information" (Watson, n.d., p.16). Dziuban et al. (2004) reported that blended learning "helps instructors evolve as designers of active learning environments, thus becoming more facilitative in their teaching" (p.10). They noted this is consistent with Carl Rogers' facilitative teacher "where instructional environments take precedence over information transmittal" (as quoted by Dziuban et al., 2004, p.10). They suggested this begins to lead or points professors in the direction of modifying their theories of teaching.

Clark (2011) noted, "Moving from "sage on the stage" to the role of "facilitator of learning" requires considerable planning and effort" (p.15). Bergmann & Sams (2012) described the teacher in a flipped classroom as constantly moving from student to student, or in some cases group to group, depending on what is happening. The teacher is not at the front of the class lecturing the same content to everyone.

Increased workload. Increased workload is one of the concerns raised by teachers who have implemented blended learning. Teachers reported that the blended format was "more time intensive than in face-to-face classes, especially in the conversion phase" at UCF (Dziuban, et

al., 2004, p.10). Contact North, Ontario's Distance Education and Training Network, noted, "In general, moving classroom teaching methods online (e.g. recorded lectures) does not work as well as courses that are re-designed to exploit the unique features of online learning" (2012, p.2).

However, it has also been reported that "an increased workload remains once the learning curve is mastered: responding to student email or chat-room activity, for example, means extended faculty hours" (Albrecht, 2006, p.8). Kenney & Newcombe (n.d.) determined in their pilot study at a college of education that "the online portion of the unit also required more time than originally anticipated for grading and providing feedback" (p.53). The authors also noted that as early adopters of the approach, there was minimal support for training, or time, to re-design the course. Despite the challenges, the authors planned to expand blended learning to all units of the course because of its benefits: "their (student) learning did not suffer using a blended approach, and actually was slightly better" (p.52). Student engagement was perceived to be higher and the students in the class recommended that the approach be expanded.

Enhanced student success. The positive reactions are recorded in other studies as well. In the University of Wisconsin's study involving 17 teachers in a wide variety of disciplines, "most faculty noted increased interaction and contact among their students and between the students and themselves" (Garnham & Kaleta, 2002, para. 5). Faculty believed the increased interaction occurred because the students were more engaged in their own learning. Most importantly, "the instructors reported that students wrote better papers, performed better on exams, produced higher quality projects and were capable of more meaningful discussions on course material" (Garnham & Kaleta, 2002, para.8). Dziuban et al. (2004) recorded quantitative evidence of grades "comparable to or in some cases better than face-to-face" (p.5) at UCF. The

UCF study also determined that blended courses could increase learning outcomes and lower attrition rates compared to fully online courses.

In a study that compared blended with online classes being taught the same course, Lim, Morris & Kupritz determined there were "no significant differences in learning outcomes" (n.d. p.27). However, the online students "experienced more challenges and obstacles in achieving similar learning levels" (p.35) than students in the blended class. In addition, the online learners felt the course was more difficult, that the workload was higher, and that they felt less supported. O'Bannon et al. (2011) determined there was no difference in the achievement levels of students who heard lectures on podcast versus those who sat in classroom lectures. Albrecht (2006) made the point that whether a course is taught F2F, blended or online, the delivery methods do "not offer a statistically more or less effective learning opportunity" (p.3) but that individually students may do better in one form of instruction over another. This is consistent with the work of Clark (1994) who said, "Media and their attributes have important influences on the cost or speed of learning but only the use of adequate instructional methods will influence learning" (p.27).

Older, mature students who are juggling job and family responsibilities; shy students who do not participate in F2F classrooms; students who are self-motivated and students who have mastered time management skills are all likely to do well in a blended classroom (cf. Tabor, 2007; Contact North, 2012; Cottrell & Robison, 2003; Dziuban et al, 2004). Cottrell & Robison's (2003) study of a blended accounting course also determined that the students felt that learning difficult material was better online and that they liked the benefit of being able to study at their own pace.

Relationships with students. While most teachers in Garnham & Kaleta's (2002) study noted increased interaction and contact, and Tabor (2007) also noted there were many opportunities for social interaction, Tabor's study also revealed "there is a sense of being remote from the students" (p.56) and she stressed the importance of "a clear channel of communication between the professor and students" (p.52) to address concerns when the students were online. Cottrell & Robison (2003) cautioned, "students need the face-to-face contact that is not found in even the most sophisticated of Internet offerings" (p.269).

Student Perspective of Blended Learning

The literature suggests that students must also change if a blended learning approach is to be successful. Students must be more responsible for their learning, something that students may resist, and some may appear apathetic. The need for transparent communication is emphasized in the literature. Possibly the best advice for the teacher who is contemplating a blended approach comes from Tabor (2007) who strongly recommended that a teacher take a hybrid course before developing one so the difference can be experienced from the student perspective.

Responsibility for learning. If teachers must reassess their role and the time commitment to launch and maintain a blended approach, students must also "reevaluate their roles as blended courses require them to incur more responsibility for managing their learning" (Dziuban et al., 2004, p.8). A student in a blended course is "a more active collaborative learner online…students new to blended delivery may equate fewer classroom hours with less work, but this is far from the case" (Clark, 2011, p.15). Dziuban et al. (2004) noted that a blended class will require a change in how the student approaches even the face-to-face portion of the course where they will no longer be passively sitting and listening to a lecture. *Harvard Magazine* (2012)

featured professor Eric Mazur who discovered the value of getting his students to interact with one another to understand concepts in his physics course. "Interactive pedagogy turns passive, note-taking students into active, defacto teachers who explain their ideas to each other" (Lambert, p.25). As Mazur was quoted as saying: "The person who learns the most in any classroom is the teacher" (Lambert, p.25). His test results and those of others back his assertion that his interactive, engaged students learned better.

Resistance and apathy. The passive lecture may be the style that students are familiar with and in some cases, even prefer. Albrecht (2006) reported on a study at the University of New Mexico where lectures were cut from three to one and the students protested; when a second lecture was added back, "the objections diminished (although) the attendance at lectures did not increase" (p.6). The preference may be based on being comfortable with what is known and not necessarily a conscious preference for lecture versus blended. These students may be focused on what they know from past learning experiences where the teacher lectured and they sat and listened. Some students may not be ready for blended learning and they may perceive reduced classroom hours and time with faculty, and more time on their own, as less than ideal. Albrecht (2006) reported the comment of one student at Penn State who complained he had to "learn everything myself" (p.4).

Potential apathy or disengaged students is a common concern. Tabor (2007) determined that many students "perceived the online topics as less important than those covered in class" (p.54). The adjustment to online learning may have also been the reason why Tabor found that students needed "more feedback for online components where they are not receiving the immediate response of a classroom environment" (p.52). A lack of, or perceived lack of social

interaction and communication can cause some students to disengage, she noted. Tabor's study revealed that 67 percent of the students said they came to class unprepared, without having read the assigned materials. One could debate whether online access made an impact one way or the other on preparation for class. Most adults today can remember a time when their teachers expected them to read a chapter in the text book before coming to class and the times they didn't have the reading completed. Makice (2012) noted a comment by Dr. Laura Berry, Dean of Arts and Sciences at North Arkansas College "For as long as we've been trying to help students learn, we've wanted students to take responsibility for their learning, and we want to use our time with them to work on the meatier stuff and deepen the learning" (para.5).

In a study that assessed whether audio-recorded lectures would reduce class attendance, a common fear of faculty, Larkin (2010) looked specifically at attendance. He concluded that access to the lectures online did not support concerns that students would not come to class; "they do value the interactive nature of learning that should arise out of face to face teaching" (p.245). He noted that most students used the recordings for review and revision. Although only used by a minority of the students, many expressed appreciation that the recorded lectures were available in case they were needed. The overall mean attendance was 84 per cent. This experience would seem consistent with a key learning from the University of Wisconsin faculty involved in a hybrid project who "repeatedly emphasized the importance of connecting in-class material with out-of-class assignments" (Aycock et al., 2002, p.3).

Communicating change. Communicating the changes, or why teachers are doing certain things and what they mean to students may help to address the resistance and apathy. It is as important as preparing faculty. Garnham & Kaleta (2002) noted students need a "thorough

orientation to the new style of learning. They need to be made fully aware of the expectations of the course, and they may need help learning to manage their time" (p.2). As Aycock et al. (2002) reported, students don't always grasp the concept of blended learning easily: "They need a clear rationale for its use" (p.4). Tabor's (2007) experience with students at Boise State University was similar; "students are quick to judge activities as busy work if they do not clearly see a benefit" (p.49).

Chapter Summary

Research into how schools are integrating technology into F2F classrooms through blended learning reveals a complex topic that connects and intersects a variety of components: faculty comfort with and willingness to incorporate technology, administrative goals to save money and its support for training to prepare faculty, pedagogical concerns, and the students' demographic backgrounds and their expectations of post-secondary educators. The research suggests that a single definition and experience of blended learning does not exist, and there is more that can be learned from post-secondary institutions, programs and faculty who convert to a blended format. Questions still remain as to whether blended learning is the final answer to how teachers can engage students in the learning process, or if the novelty of technology in the classroom will wear thin with students who incorporate it into every other aspect of their lives as well.

Topics that deserve to be explored further include the reasons for adopting a new approach to teaching; what and how much should be blended; faculty experiences with the approach; and how the age, attitudes, lifestyles and learning styles of students impacts their response to the changes in the classroom.

This is still a relatively new area for many educators and as such, a case study that explores the experience of schools that implement blended learning can be valuable. What is the preparation and on-going teaching time of faculty and what is the appropriate mix of F2F versus online? Should the more difficult concepts be online so students can replay the video or should class discussions be moved online to allow shy learners a chance to speak up? Can students manage their own pace of learning with a blended format? What technology is faculty using to support the approach and what is their experience? Some research (cf. Watson, n.d.; Cottrell & Robison, 2003 & Snowden, 2012) suggests that blended learning is better suited to some areas of study over others but there is no consensus.

Dziuban et al, 2004 suggested that a blended approach may suit older, more mature and motivated students but not necessarily be favoured by millennials - the age of many post-secondary students. Are millennial students not engaged because they are predisposed to challenge their teachers or because they already know, or think they know, the technology, as the CANE model (Clark, 1998) suggests? What is the reaction of students enrolled in post-secondary institutions? Studies portray a mixed reaction from students and more research is required over time to understand student attitudes and to learn if, or how, such things as age and life stage, propensity to multi-task, preferences for lectures or the novelty of technology impact student achievement.

Thus, this paper reviews a case study that looked at how teaching and learning were perceived to be impacted by the use of a tablet and a learning management system in a blended learning environment. How did faculty manage the pilot launch of using a new technological tool while preparing students to use an online learning management system (LMS) in a blended

learning approach? How did faculty structure a reduction in face-to-face time and manage their online instruction? How did students respond? The research was designed to ask how did either group, faculty and students, feel about the pilot, the LMS and the blended learning approach – how did they think teaching and/or learning was impacted?

Chapter 3

Methodology

Research studies that have looked at the experiences of faculty and students in a blended learning environment have frequently used a wide variety of research methods to gather both qualitative and quantitative data.

For instance, several teachers participated in individual, semi-structured interviews for a study entitled "Teacher perceptions of the flipped classroom: using video lectures online to replace traditional in-class lectures" (Snowden, 2012). In this thesis project for the University of Texas, eight high school teachers were interviewed using a pre-determined set of open-ended questions. The small number of participants made interviews a logical choice over a survey. When blended learning was implemented in an accounting course designed for finance majors, and the opinions of a large student body were sought, a survey helped to determine the student reactions to the blended approach (Cottrell & Robison, 2003). In another study, a review of a blended reading and writing course at Brigham Young University, both students and faculty were included (Waddoups, Hatch & Butterworth, 2003) and a combination of surveys, interviews and focus groups were used to determine both student and faculty reactions.

This research study sought to understand the perspectives of both faculty and students involved in a pilot project to use tablet technology in the launch of blended classes at a community college. The researcher was interested in how the tablet and a learning management system supported a strategy to reduce F2F classes in the first year of a mechanical engineering technician program. The researcher was interested in how faculty prepared for the implementation, how they used technology to support the approach and what they felt were the

pros and cons of blended classes. The researcher was also interested in how students perceived the blended approach and the technology. The program in this study prepares its students to work in the trades and although the program includes hands-on training in a shop or lab environment, lessons are also taught in a regular classroom where much of the theoretical content is taught. It was this regular classroom that was targeted for a reduction in F2F time.

The researcher was interested in the perceptions and experiences of the faculty and students - how were teaching and learning impacted by the choice of technology and the blended learning approach?

Mixed Methods

A mixed-methods approach, similar to the Brigham Young University study (Waddoups et al., 2003), involving semi-structured interviews, a survey and a focus group was used to research the population of 60 students and six faculty in this case study. Mixed-methods allow a researcher to use more than one methodology to seek answers to the same research question, a form of triangulation. When “two or more dissimilar measuring instruments or approaches are used" (Singleton & Straits, 2010, p. 432), such as the interviews, survey and focus group selected for this case study, each bring different strengths and weaknesses to the research. This "increases confidence in research findings because the strengths of one method offset the weaknesses of another" (Singleton & Straits, 2010, p. 433).

Qualitative methods. Interviews and focus groups provide qualitative data which "describe and interpret" (Del Balso & Lewis, 2005, p.262) while a survey would provide quantitative details that "describe the characteristics of a population (and its) attitudes and

opinions" (Del Balso & Lewis, p. 107). Specifically, semi-structured interviews are ideal when the interviewer wants to "understand the meaning of respondent's experiences" (Singleton & Straits, 2010, p. 266). Such interviews have "specific objectives" but the interviewer is able to "adapt the interview to capitalize on the special knowledge, experience or insights of the respondents" (p. 266). Semi-structured interviews were chosen instead of structured interviews because they allow the researcher to use "supplementary questions to gain a more complete response" (p. 266) to the question about how faculty experienced the blended format or use of specific technology. This type of interview is consistent with an exploratory study where there are gaps of knowledge in the area being researched. Interviews and focus groups also allow a researcher to meet participants in a face-to-face situation, to read body language, and to delve more deeply into questions. They also allow participants an opportunity to add their own ideas and thoughts in addition to the "key questions (the researcher would create) in advance" (Singleton & Straits, 2010, p. 266). Focus groups allow for "unstructured discussions among a small group of people" (p. 325), and they provide a chance for several participants to discuss the issues and for a researcher "to learn how people think about a survey topic" (p. 325). They are helpful in determining whether agreement exists among some members of a larger group, although the opinions of a few must not be considered reflective of everyone in the larger group.

Quantitative methods. Surveys, on the other hand, were chosen because they are an efficient way to collect information from a larger group, and they can quickly cover a wide range of topics of interest to the researcher. Responding to an online survey would be easy and accessible for college students. A survey can also separate the researcher from direct interaction with respondents, removing some, if not all, potential researcher bias. The survey's closed questions would collect quantitative details about the students and the open-ended questions

would collect qualitative information that would allow a respondent to provide a more detailed response.

Participant Research

In this study, semi-structured interviews were held before the start of the first semester, prior to the launch of the pilot, and again at the end of the second semester, after the pilot was over, approximately eight months apart. These allowed faculty an opportunity to provide in-depth responses to prepared questions and, in addition, time to offer their own views about the pilot project. The small population of six faculty teaching in the first year of the program, and their limited availability, made interviews an appropriate choice. In order to allow a measure of confidentiality, the teachers were invited to one-on-one interviews where they could freely discuss their individual practice and experience. Interviews before the start of the first semester would allow teachers to discuss their plans, expectations and concerns prior to the launch of the pilot. The second interview at the end of the second semester gave teachers the opportunity to discuss their actual experiences with the approach after the pilot was complete.

In order to provide all students a chance to comment, a link to a survey was sent to the class a little more than mid-way through the second semester, before end-of-school-year assignments, tests and exams would detract from their time and attention to respond. It was the most efficient way to give the large population of 60 enrolled students a chance to comment. In order to discuss the pilot in more detail, and to explore survey results further, students were invited to the focus group through the survey.

Initial faculty interviews. Snowden (2012) suggested that different teachers in different courses will apply blended learning in different ways. Faculty training, comfort with technology, and understanding of the approach are important keys to successful implementation (cf. Dziuban et al., 2004; Clark, 2011; Tabor, 2007). In the initial interviews (Appendix A), teachers were asked to share their philosophy about teaching, to describe what they teach, and to explain how they planned to use the tablet and the learning management system to facilitate a blended approach in their classes. The interviews explored faculty's comfort level with the technology and with the college's mandate to reduce face-to-face time. The initial interview was designed to understand their expectations concerning the new approach they would be implementing and to gather some basic information about their backgrounds and teaching experiences.

Second faculty interviews. In the second interviews (Appendix B), teachers were asked if the technology enabled them to reduce face-to-face time, how students responded to the approach and what they, as faculty, learned from the experience. Research (Dziuban et al., 2004; Watson, n.d.; Aycock et al., 2002) suggests that faculty will experience an increase in workload in a blended learning class, particularly during the implementation stage; that student engagement can increase; and that the teacher's role moves toward being a facilitator, away from delivering information.

Student survey and focus group. Dziuban et al. (2004) suggested that the blended approach is preferred for its flexibility by mature students who are juggling home, family and jobs with school while Garnham & Kaleta (2002) suggested there can be a mixed reaction from students in a blended class. College classes typically attract a wide range of students, not just recent high school graduates, and it was important to understand the make-up of the class,

including their experience with technology prior to coming to this program. The student survey (Appendix C) was created to get some basic demographic information about the students, including whether they were coming directly from high school, from another college or university experience, or if they had been working for a while before returning to school. Students were asked if they felt their learning had been positively or negatively affected by the use of the tablet and reduced face-to-face time with their instructors. The survey was also used to invite students to a focus group where the researcher could gain a deeper understanding of how their learning was impacted by the approach. In the focus group (Appendix D), the students were asked to describe their experience, what they liked about the approach and what they didn't like.

Ethics Approval

Ethics approval was provided by both the University of Alberta (Appendix E) and Mohawk College (Appendix F).

Research steps

As a first step, the teachers were initially approached at the end of the summer (just prior to the start of the new school year) by the researcher through a confidential email list established by the college; this protected the identity of potential research subjects as the researcher did not have access to their names or email addresses. Teachers who were willing to participate responded to the email providing the researcher with their contact information for subsequent communication. The invitation included a description of the study (Appendix G). College administration provided a room on campus for the interviews, and although the offer to meet off-campus was made, each of the respondents chose to meet in the campus meeting room. The first

set of interviews were completed at the end of August of 2012 with one taking place two weeks after the start of the school year in September. For the second round of interviews, the researcher sent an invitation directly to those teachers who participated in the first round of interviews. The second interviews were conducted in April 2013.

The faculty interviews were all about an hour in length and while they followed a pre-determined set of questions, and an open-ended, 'is there anything else you would want to say' question, the second interviews tended to also include questions that focused on the specific experiences of the teachers as each applied the blended learning principles to varying degree. Each teacher was provided with a gift card as a thank you for his or her participation.

To gather student response, the researcher first attended a class session in March 2013, where the purpose of the study was explained, a handout (Appendix H) was distributed and students were asked to consider responding to the survey that would be emailed to them as a link to Survey Monkey. After the link to the survey was sent via a confidential email list created by the college, three reminder emails were sent to the class to try to prompt students to respond to the survey.

The survey included an invitation to participate in the focus group; students, who responded to the focus group invitation by emailing the researcher directly, were emailed in return a description of the study (Appendix I) and details of where and when to meet. The session was an hour in length, conducted in a meeting room on campus over the student lunch hour for convenience, and each student was provided with lunch and a gift card as a thank you. The same meeting room, located away from faculty offices, classrooms and areas where other

students might gather was used for the focus group providing a sense of confidentiality for the participants.

All interview subjects signed a consent form that included details of the study and indicated their consent to participate in the study (Appendix J).

Five teachers responded to the invitation to participate in the first round of interviews, and three responded to the second invitation. There were 15 surveys completed by students representing 25 per cent of the class. Three students attended the focus group. These students could comprise a group interview but the discussion that followed the researcher's questions unfolded like a focus group discussion with the participants taking turns responding to questions, agreeing with what was said or jumping in to offer a different opinion and sometimes discussing a topic amongst themselves.

All of the interviews were recorded and subsequently transcribed. (1) Each transcription was then studied and analysed around issues identified in the literature review, such as the time to implement blended learning, how faculty planned to blend specific subject areas, the use of mobile and LMS technologies, and the motivation and engagement of students. The transcripts were also reviewed for any issues that were not previously identified in the literature.

(1) The digital recorder ran out of memory during the last faculty interview in the second round of interviews; this was noticed immediately and hand notes were used for the last half of the interview.

Chapter 4

Findings

Faculty Findings

Five teachers who teach into the first year of the program were interviewed before the start of the pilot while three of these teachers were interviewed when the pilot was done. The second set of interviews maintained a mix of gender, years of experience, and comfort with technology that was present in the initial five interview participants. Each interview lasted a little over an hour. Four of the participants were male and in order to protect everyone's identities, the pronouns "he" and "she" are not used here; instead "s/he" and "they or their" are used. The teachers have taught a range of years; three have taught between 10 and 16 years while one has taught less than six and another has taught more than 20 years. They teach technical courses such as millwright, automation, electrical, computer assisted design, pneumatics and hydraulics, and non-technical courses such as safety and quality assurance, environmental sustainability and communications. Three of the teachers came to teaching after working a number of years in the industry they are preparing their students to enter.

Pre-launch teacher interviews. Four of the pre-launch interviews took place during the last week of August 2012, just before the start of first semester. One interview took place in September just a couple weeks after the start of school. (See Appendix K for full quotes from these interviews.)

The teachers were asked about their philosophy of teaching as well as what they teach their students beyond the course content. The responses to these questions reflected a common theme of preparing the students for work beyond school's boundaries. As one participant put it,

s/he teaches students "how to think... solve problems... where to go for resources because you'll forget if I just tell you the answer." Another echoed this: "I prefer not to give the students the answers, I will answer questions with questions...because if I tell them they will forget." This teacher described how s/he introduces a new topic in the classroom: s/he will tell the students what part of the equipment or process they will be studying and then tells them to look it up and determine a description and definition, rather than telling them the information in a lecture. Another expressed their philosophy this way: "encourage growth and life long learning." One teacher explained: "Most of our important learning happens outside of exams, it comes from experience, actually hands-on...working through real world problems you are going to encounter when you are done school." Another said s/he likes to instill confidence in the students, "I try and show them they are capable of doing whatever needs to be done."

When asked why they were implementing blended learning in the program, all spoke of the college's mandate to reduce face-to-face (F2F) time between faculty and students as a driving force behind the move toward blended classes. "The college has chosen this program as a pilot to find out how quickly we can move into what is considered to be what the future of education is going to be." There is direction from top administrators to "allow students to learn any time, any place, anywhere." One teacher noted that the enrollment in the program has been going down and blended classes may be a strategy to attract students, many of whom are working full time. Another said, "They (students) are busy. No doubt about it. A lot of my students work full time. So, I think that's a driving factor." Availability of classroom space was also mentioned as a factor; "They want to reduce use of classroom space."

The use of tablet technology in the industry that their graduates will enter was noted by all of the teachers. A couple of the teachers talked to industry representatives as part of their lesson planning; industry reps told them that they are using tablets to take pictures of equipment issues in the field and then filing reports back to offices and supervisors. They also access Bluetooth technology to monitor hard-to-reach controls. One teacher described a situation involving windmills where the controls are 300 feet up and the tablet's technology is used on the ground as a way to monitor the controls at the top. "They (students) are going to be using this stuff...it is being used in industry... let's get on board." Another noted, "The iPad is certainly a skill you can put on your resume."

One of the participants noted that it would be a benefit to the pilot that the faculty in the program was already "engaged heavily" in Desire2Learn (D2L), a recently acquired learning management system at the college. The small size of the program and its staff was also an ideal condition for a pilot. The cost-savings for students using an e-textbook available on the iPad was also noted as a benefit.

Technology. Prior to the start of classes the teachers were planning to use the iPad in a variety of ways. Most viewed the iPad as a mobile way for the students to access videos, quizzes and course materials teachers would be posting on D2L. They planned to encourage the students to use the iPad in class as a way to access the Internet for research purposes. The iPad also has a built-in clicker function, and the teachers were planning to hold in-class quizzes to check class understanding of concepts being taught in lectures. They also hoped to have students use the camera feature to take pictures as a part of assignments that would imitate the way the tablets are used in the industry. D2L would hold their course materials including videos and lecture slides.

It would also allow the teachers to post quizzes that could be automatically graded. Some were planning virtual office hours with the use of the chat function.

The faculty appeared to be comfortable with technology. A few of the teachers were already using video capture technology to videotape themselves teaching software or how to do certain technical processes - tutorial videos. A couple of the teachers also have a lot of experience with both blended and fully online courses in other program areas. "Most of us are pretty tech savvy." Even if they didn't own a tablet prior to the pilot, they all have worked with technology to some extent in the classroom, as a way to either enhance classroom instruction or replace it. One teacher spoke about the need to proceed with caution and the value of less is more when it comes to using technology; "The thing is, don't just jump in and use everything, the whole arsenal, and then where is the content? Try and find subtle ways that don't overwhelm them (students), that don't detract too much from what you are really trying to accomplish."

One teacher clarified that while the tablet might aid in the reduction of face-to-face (F2F) time ("If the course is created specifically for the iPad"), it would not be the driving force behind it: "It doesn't handle video very well. It's really unstable with the Internet." Although portability of the tablet was considered a benefit to students being able to learn anywhere, several teachers also noted the pilot was using a tablet that requires a Wi-Fi connection to access online information. A teacher noted another potential limitation and benefit: "From what I understand of the research, iPads are not a great tool for writing, but a good research tool, and I am going to see how we can best use that." Another expressed the concern that "it's become this thing that can teach students, or aid in teaching students, rather than saying, this is a cool tool to keep people connected, through email, taking pictures, taking rough notes. Now it is being seen as this

computer." Apple cautioned the faculty that the tablet is not a computer, they noted, and that a student would still need a computer or laptop to complete schoolwork and assignments. Students are provided access to computer labs in the school and are not required to have a laptop when they enter the program. In fact, the teachers noted that they do get some students who have never even turned a computer on before coming to school.

Another teacher emphasized the point that the tablet is a tool, and it is the content that can be accessed by the tool that is important. "I don't think it is so much the tool itself. The tool itself is a convenience, and it's a portability issue, but it is more the content we put in there and how we use the learning platform and the quizzing that's going to make it a positive experience." This teacher also noted, "This (tablet) is a very portable access device to that (online) material. So, I don't think it is really changing my material or my delivery." Another teacher suggested that the overwhelming amount of information that can be accessed online that will come into the classroom would change the teacher's role. "Instead of me shooting (information) out like a laser beam (it will come) as an organism in the classroom (and) I am just the (person) at the steering wheel."

Before Desire2Learn, there were several different learning management systems, or different online tools used for communicating with students, in use across the college; "Students were signing into as many as four or five different systems in one day," but a mandate to use Desire2Learn (D2L) across the college became part of the pilot project. Between a new LMS and the iPad, technical support was provided to the piloting teachers. Dealing with issues such as logging on or accessing information would be alleviated by the presence of a "tech guy" in the classroom for the whole class. "If something goes wrong, I can point to him and I don't have to

concern myself with it." There were no specific concerns expressed about D2L, but one noted that using its features would be important to getting the most out of it. S/he explained one example: "I would like to have a quiz set up so that if you have not answered it by a certain day, you get an automatic email saying 'I see you have not done the quiz, and do you need some help?'" This teacher felt there would be benefit in being able to track student issues earlier in this way, before it is "too late."

Problems with the compatibility of the iPad and D2L were a known factor before school began. It was an area of concern as one teacher expressed the desire to not "stumble with the technology" in front of a class as a result of the issues. Changes were required by D2L to accommodate the Apple product. Opening videos was also recognized as a problem on the iPad; "It only opens specific types of videos, flash doesn't work at all" and videos already produced by some teachers would not open. "We have had to do a lot of work-around." There were also issues with the Wi-Fi system in the college that had to be fixed. One teacher explained that when someone logs onto the campus Wi-Fi, they have to keep logging in every 20 minutes, but for the pilot, the faculty asked for a constant login; "If, at the most, one sign-on a day then I'm good for the day." There were some keyboard issues that resulted in a number of returns. "I think that is the biggest thing, having all your ducks in a row for the infrastructure." Other issues such as theft or students losing or dropping the iPad were also noted as concerns.

The teachers were given the iPads months before the launch and were provided training by Apple, but a teacher commented on how students will drive it forward. When the students are out on co-op placement, "I am going to ask them to find ways to use this and report back."

Preparation and lesson planning. The first week of classes was devoted to getting the students to launch their iPads and purchase recommended apps, to connect to D2L, and to learn how to use the iPad functions and how to access the online resources in the LMS. A representative from Apple came one day. All of the teachers took time to walk the students through an activity to apply the iPad to their respective courses.

All of the teachers said a lot of time was required to prepare for blended instruction. One estimated the time to prep might be five or six hours to every one hour of teaching but acknowledged that others believe it is twice that, 12 to 15 hours of prep for every hour of lesson. Another said, "It's a ton of work, which is why it's a bone of contention across the colleges; the work formula does not take all of this into consideration. Maybe down the road there will be less (time required), but I have a hard time believing that because the expectations are that the evolution has to be continuous." Another suggested that being able to access resources from past years of teaching will help. Other faculty is still using tutorials that were created in the past by this teacher. "If I was doing this from scratch, we would not have time for this interview."

Another emphasized that if the online portion of the class is to be done well, the course itself must be redesigned. "My biggest fear...is whether the professor is allotted the proper time to reconstruct the course, and understands how to reconstruct the course to benefit the student the most...I know there's a lot of faculty who have no idea.... there is a huge learning curve. They are still chalk and talk." What this teacher sees is no time allowed to "tear (the course) down and rebuild," noting that when a course is properly redesigned, a teacher will figure how to use the technology so that students get the same experience as in a F2F class. Teachers design F2F courses based on the premise they will see students in the classroom, with opportunity to answer

questions, clarify instructions and provide information. An online lesson needs to be structured on the premise that the teacher won't see the students. S/he explained the dilemma when a course outline is not changed to reflect a blended course. "I am not allowed to change the course outline, but I can change the lesson plan...but the outline locks me...to the assignments of the original (F2F) class." When the teacher asked how to address the issue, s/he said the response was "reduce the difficulty...so they can do it themselves but without your help in the classroom." The teacher added, "Compared to what they (students) would get F2F, it's less of an experience because they didn't allow me to recreate the course. Anyone who has done considerable research in this area or has worked in the area would agree with that. The course has to be totally torn down and reconstructed for a tablet delivery or a fully online delivery."

The teachers had different approaches in mind for using the iPad and D2L. "It's up to the individual professor how they choose to blend it." One teacher planned to use the tablet for research and quizzes but "if I find the technology is more of a hindrance than a help in class, then I will cut back." The learning plan will be "subject to change" depending on the students' acceptance of the technology and their ability to use it. The communications course would still include paper and pen for writing so the teacher could assess the student's own ability, unaided by technology. Several of the teachers planned to use clicker technology that is included in the iPad; this allows the teacher to quiz students on content without students having to raise their hands. "We can stop at one point and put up a five question quiz and find out how we are doing. Continuous assessment of how we are doing. And because of the anonymity, we will actually get feedback."

Another teacher planned to put lessons online prior to class "so when you are with me, you are not listening to me yap, yap, yap. We are actually applying it. We might spend a few minutes here and there, highlight, answer questions; at the end of class I will have a quiz." The teacher also planned to interject tutorials using video that will demonstrate something s/he might have done at the front of the class. The video will show the teacher's hands demonstrating the task; "they can watch that again and again and again." Virtual office hours and live chats were other D2L functions the teachers planned to use.

A teacher spoke of the blended approach s/he used in another class where the F2F time is reduced by 50 per cent. During the time away from the classroom, the students are "expected to do their assignments...or I might assign a reading (and students are to) post a response to the discussion board, but I am always available during that class time for them to email me or to catch me on the discussion board. I also use Skype so they can contact me easily... so that is how I am managing the 50 per cent" of online time.

Most of the teachers admitted they felt some level of uncertainty about the pilot, indicating that it would all depend on how the students reacted. "There are a lot of question marks. Hopefully everyone will be patient, especially in the beginning."

Blended learning. Reducing F2F time in the first semester, or even the first year of the pilot, was something that the teachers had varying concerns about. They were planning to approach it slowly, assessing their students' reactions to the iPad and material posted on D2L. "I have to feel it, I have to be in that class," is how one expressed it; by second semester, "I will start looking at reducing (class time), maybe every other week...we will see how it goes... I'm always a bit concerned about these first year guys." This teacher planned to flip the classroom,

put the lecture online and then use class time for applying and testing the concepts. Another teacher indicated it would depend on the skill level of the students. This teacher has found that students at an intermediate level are more capable of handling online lessons and that those in a beginner class require the F2F. But, the idea of taking one class and splitting it, allowing those who assess at a higher level to have a different timetable from those who struggle created a concern for this teacher who once had a student comment that they must be in the "dumb class." S/he added, "I don't want anyone to feel that way." A teacher who has implemented blended learning in another class also said the pilot would go slowly; "for the first semester, we've kind of agreed there won't be any reduction in face-to-face" and instead the faculty will focus on getting students comfortable with using the iPad, "finding ways to make this useful in the classroom."

One teacher explained that s/he had started with some online enhancements to another course three years ago and then went blended, reducing F2F time in the third semester where s/he had three, 2-hour blocks a week. One of the 2-hour blocks was removed and the students were told that portion of the course would be online; "one-third of it, in essence, is being delivered online."

Another teacher questioned the definition of blended; "I know our definition at the college, to reduce F2F time is a blended program. To me blended is some online material that supplements what I am doing in the classroom." However, s/he also noted, "You can look at this as a reduction in F2F time, you can also look at it as being the opposite, and increasing the non F2F time because they (students) can go home and do things they could not before; they could for me because I had a lot online."

Fears of teachers in general concerning blended learning were noted. "I don't think it will ever happen, but this is one of the fears of a lot of faculty: if I get all this online, will I be out of a job?" Another concern this teacher has heard is about the ownership of the material that is posted online; this teacher recalled that ideas s/he created in the past for employers in the private sector belonged to the employer who paid their salary, but there are faculty who feel their classroom materials belong to the teacher, not the college.

Students. The students in this program are usually a mix of high school graduates, Second Career participants (a retraining initiative of the provincial government), mature students who have either worked or attended another school or program, and also international students. A teacher commented that s/he expected some of the students coming into the pilot will think the iPad is cool and a non-traditional approach; they will embrace it. S/he also knows "we will have people who have never turned on a computer...I am hoping they will see the point of it, which is this is everywhere and it is accelerating rapidly." Another said, "I have had a number of students who are not comfortable with computers and the iPad puts that over the edge." Another was more blunt: "We have to drag them kicking and screaming into the future."

Some students appreciate the technology. A teacher shared the challenge of teaching to a large class and recalled one student who would leave the classroom exasperated, stating "'I'll wait for the video.' It was easier for him to focus at home." It was this teacher's habit to video tape lessons after a class and post them so that what was videotaped matched what was actually covered in the class that day. "They love it because they can stop, rewind, watch it again. That's what the real strength is." Another noted, "if a student misses a class, then he can hopefully make

up for the class with the material I have posted online although I would never suggest that a student not go to class and rely 100 per cent on what I have online."

The teachers all expressed concern about student motivation and discipline. A few said that students want to see more of their teachers, not less. "I anticipate there will be some students just won't engage. One of the downfalls of it will be for the non self-starter and there's a lot of them out there." A teacher with experience using tutorials noted, "I had one student who didn't produce anything, and I went in (the LMS) and looked, and he spent three minutes on my tutorial and the first tutorial was half an hour." A teacher with blended class experience noted that the approach was successful "for some people and it wasn't for others who didn't have any self-discipline." Time management was another skill that the teachers indicated students would need. A teacher with a fully online course noted, "most of my students now, one week in, haven't accessed the online material. It's incredibly difficult to wrangle them in. If you have a classroom, it's almost like they feel more obliged to come to class, sit in front of you. Once you see them and they build a relationship, they come to class more often."

One teacher expressed a concern about the younger demographic students this way: "Teaching online is like teaching in the middle of Wonderland...students can go anywhere, they can do anything other than what they are doing. It's difficult, especially when you are in your first year, fresh out of school, not so sure what you are going to do for the rest of your life, not as committed...it's difficult for them." Another expressed concern that older, mature students would be challenged by the iPad and the learning management technology.

A teacher with blended experience spoke about being able to get to better quality discussions in the F2F portion of class after students accessed assignments and tutorials online.

When they arrived to the F2F class, "we spent most of the time in discussion, not so much here are the steps." However, s/he noted that much of the material covered in the program is "technical in nature, it's absolute. It has to follow the law of physics so it's not open to discussion." S/he concluded, "it depends on the subject matter and how well it lends itself."

The iPad and e-textbook will mean students will not have to lug huge backpacks filled with heavy textbooks around the school. One teacher anticipated students might want to bring a laptop into the classroom but hoped they would see the benefit of the iPad, smaller and lighter than even a laptop. One teacher felt the iPad would be an equalizer because everyone will have one, and s/he was hoping participation would go up.

Post-pilot teacher interviews. Three of the teachers were interviewed post-pilot on the same day in April of 2013. The interviews took place right at the end of the semester and teachers were still assessing the year-end student results. Each interview lasted about one hour. (See Appendix L for full quotes from these interviews.)

Technology. The teachers believed that the iPad did provide students with mobile access to resources that were posted to D2L. In the classroom, the teachers used the clicker technology built into the iPad; this allowed them to include a quiz in a PowerPoint and have the class respond to the questions with their iPads. Immediate results would indicate how many in the class understood the information or concept being taught. The tablets also allowed students to conduct research into teachers' questions in class. Students were also able to use the tablets to complete online quizzes that were posted in D2L, sometimes in class and sometimes on their own time.

A teacher also explained how the iPad allowed the teachers to move about the classroom and run the projector from the tablet in their hands. However, the teacher added, "I didn't find that to be particularly useful...I like to have my hands free." S/he also suggested that when the teacher is focused on the iPad, their attention is not on the class. This teacher preferred the touch-screen technology on classroom monitors. "It's as if the monitors are giant tablets themselves."

When asked to comment on how important the tablet technology was to their lesson planning and their instruction, the faculty responded that "a small laptop would be as effective" or that a "fully functional laptop would be a better choice." At the same time, one teacher suggested laptops would create another issue because the classrooms could not accommodate plugging in multiple laptops. Laptop batteries do not last as long as tablet batteries; tablets could "last all day and another day and a half sometimes."

The teachers spoke of problems with compatibility between the iPad and D2L, but all were quick to note these should be resolved with an updated version of the learning management system. The teachers also reported that next year will be "bring your own device" so students will be expected to choose for themselves.

D2L was used to post class lessons, videos, and assignments for students to access on their own. Online quizzes were used for both formative and summative evaluations. One teacher explained how s/he set up a progressive evaluation where if a student earned a certain percentage on two quizzes, then a third quiz would open and completion of it would earn a grade. The technology also allows a class of students to complete a quiz at the same time in the same room, but the specific questions and the order of the questions can be randomized. Students sitting side by side in the class are, in effect, completing different quizzes, reducing the chance of

cheating. "All my math questions, because of D2L, every time you open (the test) up, (it) has a different set of parameters." The automated grading also reduces marking time for the faculty who can spend time on other, more project-based assignments throughout the year.

With regards to training, a teacher who self-identified as an early adopter of technology suggested more training on D2L would be beneficial. "I think there are a lot of automated tools in there that I am not using as I should be."

Blended learning. Although the faculty was not required to reduce face-to-face class time during the pilot, and they were in fact scheduled for the full two or three hours in class as in past years, some of them did manage some reduction in F2F time and used the technology of the iPad and D2L to increase online interaction.

One teacher explained, "Yes, I won back some time to do some hands-on with some of the equipment in the lab." When s/he suggested to the class that they could access a video of the lesson online and that their time would be better spent in the lab, "I didn't have any complaints at all." Another teacher found half of the class needed some remedial lessons in order to be at or closer to the skill level of the other half of the class that s/he described as "fairly strong students." As a result, s/he limited the blended approach to research, some online discussion posts and a few assignments that students were to complete remotely, but with the teacher still available in the class for assistance.

Another teacher explained the difficulty in reducing lectures. S/he would post all of the content with a quiz online prior to class and direct the students to access the material and attempt the quiz before returning to the next class with questions. It was the teacher's intent to spend

class time summarizing key concepts only and then respond to questions, but s/he acknowledged that s/he would often end up lecturing on the content, "I need to be better at summarizing. It's the old sage on the stage - it comes back." Another teacher also noted that it is challenging to not provide the lecture when students arrive without having reviewed the material. "I have had other teachers say just do it, and let (the students who did not read the material in advance) fall by the wayside but I have a hard time letting go... you are still doing that hand holding thing a little bit."

The teachers were aware that at the start of the Winter 2014 semester that all college programs will be scheduled with 30 per cent less time in their classrooms. A three-hour class will be scheduled for two hours F2F and one hour online. There was some confusion about what will happen to a two-hour class, "whatever that math comes out to, 45 minutes or whatever. I don't know how you do that."

A faculty member with experience in teaching blended classes in other programs noted that s/he thought blended was "the best of both worlds," meaning online and F2F. "If they don't see you for one week, say, they are probably going to see you the next week (or) they can email you."

Students. The faculty all expressed concern about student motivation and time management. "There are some students that are not self-motivated to make sure they get everything done" and "It's more poor time management." Referring to the online resources, a teacher noted, "There was a large portion of the class that didn't even look at it." For some, the iPad's access to the Internet was a distraction. "I think it has helped the students that want to learn, but it has become a distraction to those who are there to do, whatever. Who are deciding not to."

A teacher said, "The students wouldn't engage. The guys that did engage, loved it. That was for probably 20 per cent of the class. A very low margin. The other 80 per cent of the class, it was just brutal." As to the reason for this split, "I haven't had enough time to really understand" whether it was the technology, the reduction in F2F time, or the particular ages and backgrounds of the students in the class.

A teacher with blended experience noted, "The reduction in face-to-face time means students need to be that much more self-directed, and many of them just aren't, they don't have that self-directedness yet, whether that is an age thing, or experience thing, or they are not used to that, I think for many students, they won't use these tools to their full advantage, unfortunately." S/he noted, "I get mixed reviews. Some students know they need to be in a face-to-face classroom, in order to perform. Other students say this is fantastic, I can do this on my own time." This teacher has noted that older, mature students who have jobs or families, or may be returning to school for a change in career "tend to manage their time a lot better."

Two of the teachers expressed a concern about whether the kinesthetic learner, who prefers a tactile, hand-on approach to learning, was the best candidate for blended learning. "When you leave it to them, whether it is the type of students we have because our students are more tactile than academic, we're not really sure, but that's what I feel. They are more tactile - show me, let me feel it, then I will learn it, but expect me to read something and then do it, likely I won't learn it." Another said, "I don't think my students are the ones that really respond well to a flipped classroom." This was a first year class and a teacher expressed the thought that perhaps by fourth semester, students may grow in their motivation and ability to achieve success in a blended format.

One teacher talked about an extreme difference in student success in the pilot. Two students received 100 per cent, a "very rare" occurrence, in assignments. "I had lots in the 90s, high 90s and 80s," yet for a big project that was due at the end of the semester, "this was the worst year I have had yet for people who did absolutely nothing. I mean they handed in absolutely nothing. I had nine students who came in on exam day. None had done a single quiz all year." The teacher credits motivation and time management as the reasons behind differences in student achievement. The students who earned the 100 per cent came to see him for feedback and then did the assignments over, an opportunity available to all of the students.

Another teacher also talked about student success, noting that for those students who are engaged, "certainly they learn; it is reflected in their test scores, and their papers." These are also the students who make better use of their time, work on projects that need attention when they are not in the classroom, and they are also the ones who "participate in class."

Learnings. The teachers spoke of what they learned from the experience and had some personal goals for the next time they taught, such as, using the clicker more, putting more lessons online - flipping the class, challenging the students to do more outside of class, and creating a staged assignment so that component parts are graded prior to the final deadline. Another idea was to implement a pre-lab test that must be passed before a student would be allowed in the lab. Professional development for faculty to learn more of the tools in D2L was also noted. Another was adamant that the students need to be educated about the approach. "We have to educate, or re-educate our students that this is the way it is going to be."

Student Findings

Student survey. There were 15 students of a possible 60 (25 per cent of the class) who responded to the survey that was distributed in March 2013, just before the busier end-of-year time in a school year. (See the completed survey in Appendix M.)

Previous experience. Most of the respondents entered the program from either another college program or after working. Only three of 15 entered the program directly from high school so the majority of respondents would be considered mature. None of the students indicated that they had used iPads or any other kind of tablet in previous school programs and only one of the 15 indicated that they owned a tablet so the respondents had minimal experience with tablet technology. However, about half of the respondents indicated that they had previously experienced a course where technology was used to replace an instructor's lecturing at the front of the classroom. The three comments provided indicated a mix in opinion, from "it was easier than going to class" to "I hated it."

Learning online material. The students were asked about their experience in the pilot project. Specifically, when course resources were put online, was it possible to learn the material without direct instruction from the teacher? A majority indicated sometimes. Two of these respondents explained their preference for face-to-face: "would much rather have in-class lecture" and "You can always learn more from a prof than a screen."

Reduced F2F class time: To determine if the students were conscious of a reduction in face-to-face class time, the survey asked if their class lectures had been reduced in the past

year. Most agreed that class lectures were reduced as a result of resources being available online in their program.

iPad access. When asked how often they used their iPad to access online resources across all of their courses, most said daily.

What worked, what did not. When asked to comment on what aspects of the pilot worked well and why, some students noted the convenience:

- Easy, convenient.
- Yes, it is great. We can access our courses anywhere and anytime.
- It was easier just to open up the iPad instead of going to class.
- Doing tests online worked well because I did not have to drive to school and write the test in class.
- Not having a large book load and having instant access to notes.

Some commented on the benefits to how they learned:

- Having access to the material ahead of time helped to streamline our in class time. Instead of just being taught the material we could ask for clarification on points we were unsure about.
- The ability to follow along in class lectures and simply highlight information instead of having to write out overhead lectures.
- I also like using it in the labs for schematics and data collection.
- The content section where all assignments and information were posted. This worked really well, it allowed me to review exact information whenever wherever.
- The iPad made it possible to write our own notes on top of Power Point slides while recording lecture, for further review, thru the Notability app.

When asked what could be improved, most of the comments reflected technology or compatibility issues:

- Some of the notes that are put online don't show up or don't load up.
- There were a few bugs in the system. Mostly email related which I'm sure will be ironed out.
- E-learn's (D2L) iPad accessibility with HTML and not being able to email directly from iPad so it is necessary to own or have a household or laptop computer to access. Also the information gets jumbled together where as with books it is very organized and in order.

- Compatibility issues
- Emailing sometimes is difficult as well as flash player not available on this device.
- Not everything was accessible on the iPad. If there was a way to do so, it would make things much easier
- Resolving issues w/ e-learn compatibility w/ iPad.

Did you learn more, less or the same. The students were asked to compare the past year to their last educational experience, whether they had learned more or less in the pilot compared to the last time they were in school. Most of the respondents said they learned much more or somewhat more.

Effectiveness of methods. The students were asked to rate the effectiveness, from very effective to very ineffective, of a variety of methods of learning, including: iPad, Desire2Learn learning management system, e-text, online lessons and reading material, teacher lectures in the classroom, hard cover text book, quizzes in the classroom and in class exercises or problems.

An equal number of students indicated that online lessons and material, teacher lectures, quizzes in the classroom and in-class exercises or problems were either very effective or effective. The highest number of students rated online lessons and reading material effective and the next highest number of students rated teacher lectures as very effective.

The learning management system was viewed as either very effective or effective by most of the students. A similar number viewed the e-textbook as either very effective or effective. A smaller number of students viewed the iPad as effective or very effective.

About a third of the students were neutral about the hard cover textbook while a smaller number, three, viewed it as either ineffective or very ineffective. In comparison, none of the

students selected ineffective or very ineffective for the e-textbook. Only two students said the iPad was ineffective.

Time spent online or in meetings. Another question asked for the amount of time students spent accessing course material prior to their classes. Most of the students were split between either less than 15 minutes and half an hour accessing course material prior to each class.

Next, students were asked to indicate how much time was spent after class online reviewing course material or working on assignments or lesson material provided in class per course each week. Here, there was no clear majority in the responses with a small number choosing more than two hours a week per course.

All respondents said they usually or always came to class prepared.

To learn how much time the students spent meeting face-to-face with their teacher outside of class time, they were asked to choose from a list of options from never to more than once a week. Four indicated monthly and the same number indicated weekly while the remaining six responses were split across all the other options.

Preferences regarding lectures, reading material. If given a choice, most of the respondents said they would prefer to listen to their teacher lecture in the classroom. The next preferred choice would be to listen to and watch a video of their teacher giving a lecture online.

If given a choice between reading an e-textbook on screen and a hard textbook, the response was closely split with slightly more choosing the e-textbook option.

Student Focus Group. Two students responded to the invitation to participate in the focus group and on the day of the meeting in March 2013, a third student came after his classmate asked him to join in. The three male participants were all mature students, meaning they had not entered the program directly from high school. (See Appendix N for full quotes from the focus group session.)

Orientation. The students felt the weeklong orientation they received was beneficial. Sessions on the learning management system (LMS) and the iPad were held. Representatives from Apple came as well. "The whole first week of our course was nothing but training on how to use this thing (iPad). By the end of it I could close my eyes and use it (iPad)." The students agreed their teachers did an excellent job of posting "all the information I need."

However, the students suggested that more bugs needed to be worked out before the launch. "If they had done a little bit of beta testing, we'd probably be further ahead and we might have that reduced class time after all." They felt their teachers' time was taken in translating material for the iPad and dealing with glitches. They felt the effects of being the first group to experience the changes. "They were assembling the course as they were teaching it." Another put it this way, "It is still a big puzzle they are finishing."

Learning management system. The students felt the learning management system "was a breeze." They were able to access all course content on the system. Two of the students shared similar stories concerning the value of having access to that content after they had to miss classes for an extended period of time. "All the work is there. I was able to stay caught up."

They appreciated the reminders that would pop up on the iPad concerning due dates, coming events, what is past due etc.; "I find it is solving my organization skills." They also recognized their teacher's ability to see who has completed quizzes or watched videos and that students who didn't access the provided material had no reason to complain if they didn't do well on tests.

iPad. The students said that the iPad was "less bulky" and easier on the back than a backpack filled with books, and it was mobile. "You can be learning anything anywhere," said one student. "As long as you have an Internet connection," another interjected. In this case, the students felt a laptop, while larger than a tablet, would provide the same access to the Internet. They knew that next year's class would be required to bring their own device and their advice would be to "just get a laptop."

They noted that the tablets were not insured against theft or breakage: "Out of all electronics...this is probably the highest theft item." They told the story of another student who dropped his iPad, and he is now working with a cracked screen because he can't afford to replace it.

They also spoke of safety concerns in the shop environment. While they were told not to bring the tablets into the shop, they said the steps to a process they will be practicing in the shop are online and "a lot of students bring it to class anyway and watch it as they are trying to do what's supposed to be done. There are safety protocols being infringed on because they are bringing their iPads into the shop." A student shared a story about other students who will approach him to ask a question, expecting him to look at the video they are playing on their iPad while he is working on the lathe.

But they credited the iPad for its easy access to the information they needed for class. "Now I am on the iPad, I find myself confronting them (the teachers) more with material I don't grasp, rather than waiting for class." One noted that as long as you remembered to upload projects, it would eliminate forgetting material at home. They also liked and used the iPad's function to record lectures in class, easier than writing notes. One of the students liked the fact he could build his own library of resources in the cloud to access them at any time and as a future reference after he has graduated. He noted that it is up to each student to determine how to use the iPad to assist in learning; "I prefer to just load (resources) into iBooks and have a hard copy of it indefinitely." They thought the iPad made it easy to be prepared for class and saved them from lugging heavy books to class. One said in a previous course he would just leave the heavier resource material, such as "two massive building code binders" at home; "I just didn't have the energy."

***Blended Learning*.** The students did not feel that there was much of a reduction in lectures or F2F class time, but they believe a reduction is possible with the iPad and D2L. "If everybody was willing to read the material ahead of time, we could just set aside maybe half an hour for question and answer." Another suggested a portion of a day each week could be set-aside for a student to meet "one-on-one with the instructors." They suggested if more teachers offered live chats online, that the class time could be reduced.

They felt that some material could be handled entirely online, "For AutoCAD I could just do tutorials at home and it wouldn't make a difference if I even went to class at all" while "the math heavy or hydraulic stuff, or really concept heavy stuff, I need to be in the class. I need to have the teacher explain it to me." With online access to material and the use of live chats online,

one student felt the class time for lectures could be eliminated. He felt the lectures were not the way to reach hands-on learners like him.

However, they all cited a number of reasons for why they do attend F2F lectures even when they found that some of the F2F lecture was a repeat of what they had reviewed online prior to class, "cause not everybody goes ahead and reads the material." One student noted that if he didn't have questions, he could have stayed home and worked on an assignment but he chose to come anyway. "It reinforces it. And I could ask clarifying questions." One of the students noted, "You can't ask a slide a question." Another said the F2F lecture was more in-depth: "He explains the slide a little bit more. He puts the words in for you so it is beneficial to show up for class." Another said, there's a "big benefit to going to the classes...when I see the person in front of me, I learn more, I learn better." They also believed that a teacher could "watch you while they are explaining something" and see when a student is not grasping content. They all enjoyed and felt they benefited from the real world examples that teachers shared from their own work history.

The students did note that attendance at lectures was very low at the end of first semester with only 10 or 12 people coming, and one recent class had only four students. They noted that it depends on the students. "If they are going to slack, they will slack." Another agreed, "If they know they have that lenience, they might take advantage of it too. And I think a lot of them are...but that is their own downfall."

The participants wondered if blended learning would "push the maturity up in the classroom; I wonder about classrooms with no older students if it is a lot harder for the teacher to keep control." The discussion on maturity continued. After saying he spent an hour preparing for

class, one student said if a teacher were to announce "in the next class we are doing Unit 8, pages such and such, I wouldn't bother - we're going to do it in class anyhow." When asked why he spends an hour now, he responded, "Cause I'm that guy." Another added "Cause you like to have that advantage and prepare your questions for the instructor. Cause half way through you don't want to be rushing and writing things down and then you are missing content from the lectures." When asked if maturity was at play, all agreed. "Lot of the younger guys, you just don't see them in a lot of the classes."

Impact on learning. When asked if the availability of lecture material online, the iPad, and reduced lecture time had enhanced their learning, they responded yes and no, and it was the technical glitches they said detracted from the learning. They noted different issues such as the audio cutting out on videos, cursors being stuck in one place on the screen, and a video forcing you to reload and start again every time it was paused. Although they felt teachers responded quickly to any issues, it would have been better to "work out the bugs ahead of time." There was a feeling that some teachers did not get to other plans because the translation issues and addressing glitches took time.

They liked being able to record their teachers' lectures, an easy-to-use feature on the iPad. "I always have problems with notes, and I will miss half the content but most teachers are okay with you pushing the record on (the iPad)." Another commented on the clicker feature in the iPad that students would use to respond to questions in a lecture. "It makes you feel like a part of the class."

Another commented on the access to lecture material before the class that allowed him to look over the notes in advance of class. "Then I could have an idea in my head, ahead of time,

ok, I don't understand this so I'll have to ask some questions about that." He said it made the process in class faster and he was able to ask more in-depth questions.

Chapter 5

Discussion/Conclusion

The findings addressed the question this case study was designed to research, 'how were teaching and learning perceived to be impacted' by the choice of technology and the launch of a blended learning approach. The responses from faculty and students suggest several themes that are discussed in this chapter.

The first is the issue of learning styles, particularly kinesthetic. Faculty questioned if blended learning was the right approach for their hands-on learners and linked the question of learning styles to their students' poor academic results. Specific learning styles were not addressed in the literature on blended learning, and the studies that looked at students' results suggested similar or better test results in blended classes compared to face-to-face. Thus, the first part of this chapter reviews research on learning styles that may be relevant to the findings of this study.

The review on learning styles naturally leads into a discussion of what subjects may be better suited for online and what may be better suited for face-to-face instruction followed by a look at the specific technology used in this pilot. The faculty also talked about the relationship they have with their students and their concerns about being able to maintain that when F2F time is reduced. This issue of relationship and its impact on learning is discussed. Both faculty and students raised the issues of student motivation, time management and responsibility for learning and these areas of concern are also addressed. Student success and the orientation to blended learning for both students and faculty is discussed, along with other specific faculty and student

concerns that were raised in this study. The chapter highlights a number of questions throughout the discussion that suggest potential areas for further research.

Stage of Adoption

Before moving onto a closer inspection of the discussion, the author would suggest that based on this case study blended learning seems to be at the early adopter or early majority stages of adoption. The results of this case study are consistent with the adoption reflected in other literature.

Learning Styles

It was the perception of the teachers in this case study that blended learning may not be the best approach for the hands-on type of learners they believe are attracted to the program; the concern was expressed, in part, because many of their students did not have a successful academic year. One of the teachers said the students in the mechanical engineering technician program "are more tactile - show me, let me feel it, then I will learn it." A student comment was consistent with this perception; "I'm a hands-on type of person. I need a lot of change." This particular comment also raises the question of whether this student's need for change is best met in a classroom where the teacher is directing activity, or if a student would be able to create that needed change when he is in control of his own time in front of the computer accessing online instruction.

Cranton (1992) defines learning style as "an individual's preferences for ways of learning" (p. 40), and she describes Kolb's Theory, one of the better-known theories about learning styles in adult education. Cranton's work in adult education is applicable for a

community college that teaches adult students from a wide range in ages. Kolb's Theory describes a cycle of four stages involved in learning that includes concrete experience, or actual involvement in a new experience; reflective observation, or observing either self or others in an experience; abstract conceptualization, or creating theories about observations; and active experimentation, or using theories to solve problems (Cranton, 1992). Kolb suggested that learners tend to "prefer one stage of the learning cycle more than others" (p. 41).

The students in this study might prefer concrete experience under Kolb's model – which suggests they need to be doing something or interacting directly with new information. They might also fall under reflective observation as a teacher also noted that the students "love" the videos that show the teacher "doing something and talking about it as I do it." The student focus group comments echoed these benefits of video. Kolb described learners whose learning preferences cross concrete experience and reflective observation as "divergers (who like to) explore all of the possibilities and may have trouble focusing on a task" (p. 42). As the student quoted above expressed it, "If I am in the same room every day reading the same thing, I just want to start banging my head on something." This raises the question of whether this suggested trouble of focusing on a task might make a blended course more challenging or more engaging for divergent learners. Would it be difficult for them to focus while on their own away from the classroom, or would the reduced F2F time allow a divergent learner more control to study at his or her own pace? Blended learning offers both online and F2F instruction, but if the approach to teaching in each of these strategies is similar, for instance the placement of a classroom lecture online, would it address a diverger's need to "explore all the possibilities" (p.42) or the diverger's struggle to settle on one task?

Another instrument for recognizing student learning styles is described by Drago & Wagner (2004): VARK stands for visual, aural, read/write and kinesthetic. This model suggests that visual learners like demonstrations, aural students like hearing the information, read/write learners like to take notes, and kinesthetic learners like to learn by doing. The authors determined from their study, that looked at online MBA students, that the "online students scored higher on three learning styles; visual, aural and read/write" (p.6) and that the online courses "seem to be attracting students with a high visual and read/write learning style" (p.11). What does this suggest for kinesthetic learners? Drago & Wagner reported that the "visual learning style is positively and significantly associated with the aural and kinesthetic learning styles (while the) read/write learning style was strongly and negatively associated with the kinesthetic learning style" (p.11). Their findings suggested that students with a combined aural and read/write style were "highly satisfied" with the online courses while the read/write learners "appear to be less satisfied" (p.11).

The case study's findings appear to be consistent with this perspective of hands-on learners. Although not inclusive of all students, satisfaction was expressed with the online components of the program, and in fact, some students did express a preference for videos that were posted online by their teachers. The students interviewed in the focus group indicated they liked to take audio recordings of their teachers' lectures while they were in the classroom (and some students held their iPads up to take a video recording), which might reflect visual and aural learning styles. The focus group participants even suggested F2F time could have been further reduced and replaced with online content. The survey, however, indicated that if given a choice, the majority of the students who responded would prefer to listen to their teacher's lecture in the classroom than watch a video recording of the lecture or listen to an audio

recording of the lecture. The video recording would be their second choice with an audio recording embedded into a PowerPoint their least preferred. The survey results are not incompatible with the focus group discussion as the students in the focus group also noted they liked to record their teachers *while they are in the classroom* - a way for them to listen to the F2F lesson they attended, over and over. They could cite several reasons why they still come to a F2F lecture after accessing content online prior to the lesson. The findings in the case study reveal a mixed reaction with a preference for face-to-face lectures suggested in the survey and the focus group findings suggesting this preference may depend on the subject being taught.

It is not possible to directly compare the results of this case study with Drago & Wagner (2004) as so many factors can impact student satisfaction, and the students in the case study were not asked to indicate their perception of learning style. However, the findings do lead to a number of questions. Can video recorded lectures that include both the visual and aural perspectives effectively replace face-to-face instruction for engineering students similar to these? Does their apparent preference for hands-on experience suggest a preference for a real person delivering the information versus a video - or is it just a matter of what they are accustomed to from past educational experiences? The focus group participants discussed the value of a teacher delivering a lesson in the classroom versus being able to listen to the lecture on their iPad. One student expressed the positive value of F2F interaction when he said "I learn better" when listening to someone in front of him, while another student suggested a teacher in the classroom "can watch you" and see at which point the student has stopped understanding. However, even the student who said he learned better in a F2F class suggested there were some courses, AutoCAD for instance, where "I could just do the tutorials at home and it wouldn't make a difference if I even went to class at all."

The subject being studied might be a key difference in a student's preference for a live lecture versus a video recording, rather than their learning style. When considering the needs of students in the mechanical engineering program, everyone needs to see how an electrical board is wired or what functions do what in an AutoCAD program, activities that are presented visually to the students via video. It would be difficult to explain either without images or the students seeing it. This leads to two questions, the first being what subject areas are best presented via online instruction versus what should remain F2F in the classroom, and secondly, whether the technology of choice in this pilot, the iPad, was the best medium for presenting the online course information.

Some research suggests that teaching to a student's preferred learning style will not ensure success. Willingham (2006) reviewed research on visual, auditory and kinesthetic "modalities" (p.1) of learning. Citing evidence that tailoring instruction to students' modalities "has no educational effect" (p.3), Willingham concluded, "material should be presented auditorily or visually because the information that the teacher wants students to understand is best conveyed in that modality" (p. 4). He explains, for instance, there is no sense in searching for an auditory representation of the Mayan pyramids because "everyone should see the picture" (p. 4).

What to Blend

Students in this study found "for some of the math heavy...or really concept-heavy stuff, I need to be in the class, I need to have the teacher explain it to me." However, watching an AutoCAD tutorial or a board being wired, for instance, were lessons that taught a specific skill, and it was helpful for the students to be able to see the teacher performing it more than once,

something they could do with video. Some students even watched the videos while in the shop as they tried to practice the skills.

The literature review (Tabor, 2007; Snowden, 2012) and this study revealed there are many ideas of what should be placed online in a blended format, yet many of the thoughts appear to conflict. Is online or F2F better for technical material? Are discussions more engaging online or F2F? Should challenging material be presented F2F or online?

Further research might reveal if the learning styles of students would explain the varying opinions of what is best online and what is best F2F. Would students who prefer Kolb's (Cranton, 1992) abstract conceptualization stage of learning or who fall under Drago & Wagner's (2004) read/write definition have ideas of what should be online and F2F that would differ from kinesthetic learners, for instance? Could teachers start to use this information to guide decisions about how to plan their blended courses? Could it force teachers, who often present information according to their own preferred learning style, to reflect more on what is better presented F2F and what should be placed online? Research could also help determine if a student who thinks a particular topic is best delivered online, and it is delivered online, would be more successful. Would the fact the delivery matches the student's opinion, and preferred learning style, contribute to that student's success? Further research into the best modality for teaching particular subject areas may provide more information about the factors that might impact choices regarding the best delivery method - online or F2F - in a blended environment.

The other question with regards to what topics to blend and learning modalities centres on the choice of technology.

Choice of Technology

This case study looked at a pilot project in which a number of elements were converging. The move toward blended learning was new to some of the faculty, but that was not the primary focus of the pilot. The use of a tablet as a tool for teaching was new, and coincidentally, the learning management system (Desire2Learn) was also recently changed. The pilot was designed to determine if the tablet, or specifically the iPad, was a beneficial tool in the launch of a blended learning approach. The findings show that both faculty and students expressed the opinion that a laptop would have been just as good, if not even better, than the tablet. It is possible that the number of compatibility issues between the iPad and Desire2Learn that were evident from the start clouded the opinion. The findings suggest that the reason for choosing a particular technology is because the students may be using it in their future jobs, but being familiar with a variety of technologies could be beneficial in just about any future career. That particular value is noted in the research as well (Dziuban, 2004).

As for academic use, the students accessed videos on the iPad and used these to review tutorials uploaded by their teachers. They downloaded their e-textbook and stored it in their iBook libraries on the iPad. They used the audio recorder to capture their teacher's in-class lectures and then listened to them again later, or before tests. The students used the iPad in class to access the Internet and conduct research, and the batteries were strong enough to last throughout the school day. They were able to easily carry it to class and approached teachers with their questions with the iPad in hand. In fact one student expressed the opinion that because of the easy access to information, he approached teachers more often with questions rather than waiting for class. The strong link between visual, aural and kinesthetic learners suggested by this

would be consistent with Drago & Wagner (2004). Further research would determine if there would be significant differences in how tablets and laptop computers present information and are used by these types of learners. Would the student who approached faculty with the iPad in hand, have done the same with a laptop computer?

Faculty used the iPad as a way to control the classroom projector and as a clicker for student responses during in-class quizzes. They created assignments that took advantage of the mobility of the iPad, its built-in camera and its recording functions.

While the camera and recording functions would also be found in some mobile phones, which it might be argued are even more portable than a tablet, the iPad's screen is larger for viewing images or videos and for accessing quizzes or reading material posted by a teacher. A tablet's keypad might also be easier to use for typing quiz responses or short reports when compared to a mobile phone. When compared with a laptop, however, it is more portable, and tablets frequently have longer lasting batteries than laptops that need to be plugged into an electrical source.

The learning management system was a benefit to the blended approach in the study and the students found it easy to use. Although all teachers said they were comfortable with using the LMS prior to the start of the pilot, the need for them to learn how to use all of its functions was noted in the post-pilot interviews. The LMS is key to a blended program, a finding from this study that is consistent with the literature review (Watson, n.d.).

The college has decided to implement a "bring your own device" policy for the next year, and that will create other questions. If everyone in the classroom has a different device, a teacher

may need to create assignments and lesson plans with that diversity in mind. Knowing there is a consistent technology in the students' hands creates a level playing field for students and for planning purposes for teachers. Research into how lesson planning in a technologically diverse classroom is carried out would be helpful as the influx of different technologies in the classroom continues. It may also be prudent for students entering a blended program to understand how the technical device will be used so they can make an informed decision about what to purchase. Ensuring the LMS can support the variety of technological devices will be critical for the institution and those that use the LMS. What will also be important, however, as the teachers in this study generally acknowledged and research supports, whatever technology is used, it should be seen as a tool, and "not as replacement teachers" (Gliksman, 2013, p.8). This concern that the technology would replace teachers entirely was not a personal worry of the teachers in this study, but one said s/he had heard the concern expressed by other faculty. The fear gets to what is sometimes considered the heart of teaching - the relationship a teacher develops with his or her students.

Relationship between Teacher and Student

The teachers in this study did talk about the relationships they have with their students; as a previously quoted teacher noted with affection, s/he worried about the first year students. Another expressed the concern that in a reduced F2F class situation, there is "less time for 'how are you feeling, how is it going' in the classroom." Some felt their students usually "want more" of their teachers' time, not less.

A report regarding MOOCs (massively open online courses) that came out during the writing of this case study might support the idea that students want a teacher in the classroom.

The report (Steele, 2013b) discussed the experience of Colorado State University-Global Campus that “became the first university in the US to grant credit to students who passed a MOOC” (para.6). One year after launching the offer to grant credits, not one student had signed up. It is difficult to draw conclusions from this information as there may be a few factors involved, including the cost of credit courses, but this relatively new and quickly changing area of education bears further research**.**

It may be that "physical attendance...still offers the best opportunities for student-student and student-staff interaction" (Procter, 2003, p.3). Another study that provides some interesting insight into student-teacher relationships compared fully online with blended instruction. Lim et al. (n.d.) compared learner satisfaction between online and blended learning. The authors reviewed studies that reported "shared feelings and emotions between learners and instructors" were among "the most important factors influencing learner satisfaction and learning transfer effectiveness" (p.28). Their study found students in the fully online courses were less satisfied than those in blended courses where there was still a F2F component. In another study that looked at student engagement, Garnham & Kaleta (2002) suggested that despite concerns blended learning would reduce student-teacher contact because of the reduced F2F class time, the opposite was discovered and the contact increased because "students are more engaged in learning activities and therefore will seek out more assistance" (p.1). Just as the student in this study noted in a previous quote, he found he approached his teachers more often with the iPad in hand because the information was so accessible. Did the fact this learner could hold a tablet in his hand directly impact his sense of engagement with the material and therefore enhance his interaction with faculty?

Do students share the faculty concern about contact and relationship? The students in the focus group expressed satisfaction with the level of access and assistance available from their teachers. They even expressed admiration for the time the faculty devoted to the program, and they recognized the extra work their teachers were doing because of the pilot. While the survey suggested most students met either weekly or monthly with their teacher outside of class, the teachers did not believe the amount of contact outside of class increased over their previous experience. Other studies have touched on the topic of relationship, such as one involving university students in a blended learning course that found "every blended student who participated in the focus group felt that the instructor cared for them as individuals." (Waddoups et al., 2003, p.276).

Students and teachers may view contact and relationship differently. It is impossible to know if the fact students did not increase the amount of outside-of-class meetings in the case study was because they just did not require (or did not think they required) assistance or feel the need for more contact, or if they perceived a disconnect in their relationship with the teacher because of the reduced F2F time. It would be helpful if further research asked the same questions of teachers and students in order to reach a better understanding of the nature and extent of outside-of-class contact time and teacher-student relationships in blended programs.

Student Motivation, Time Management and Responsibility

The findings indicate that faculty was concerned about what they perceived to be a lack of motivation and commitment in their students, and that many students did not take on responsibility for their learning**.** It appeared to faculty that students who were older, managed

their time, and were responsible fared better than younger, less motivated students. The focus group discussion appeared consistent with faculty observations. The students expressed frustration with younger students who they say did not pay attention in class or came unprepared.

What is missing in this discussion is the opinion of the younger students. The majority of survey responses came from students who had either worked or attended another college program previously and the focus group participants were all older students, not recent high school graduates.

Developmental Approach

Responsibility for one's own education is cited in research as one of the elements that is required in a blended course (Dziuban et al., 2004). A look at Pratt's (2005) different teaching perspectives in higher education is informative; he described the developmental perspective that encourages students to develop "greater independence" (p.131). Under this perspective, "teachers should see themselves as occupying a brief but important role in the student's development, not unlike a pair of training wheels on a child's first bicycle" (p.131). The structure of a blended learning course, where F2F time with faculty is replaced by online delivery, forces a developmental perspective in which students are encouraged to "become independent self-directed learners" (p.131). The faculty in this study recognized the need to change their traditional approach to the classroom, described by one as the "sage on the stage," and to encourage their students to be motivated to work independently. Their approaches to teaching and their philosophies about teaching appeared to be established prior to the pilot and would also seem to support a blended approach. Generally, the instructors appeared to be willing

participants in the blended learning pilot and appeared to recognize a need to change their approaches to encourage more responsibility in their students.

Learner Control

In her paper for the American Psychological Association, McCombs (2013) explained the link between "student motivation and self-determination" (p.1) suggesting that when students have choices in their education, they take ownership and are then more responsible and motivated. "When students feel a sense of ownership, they want to engage in academic tasks and persist in learning" (p.1). While Pratt (2005) also noted the importance of learner control, it is important to note that blended learning does not inherently imply more choice for students. The teacher is generally making the decisions about what to place online and what to teach in the F2F classroom, for instance. A teacher would have to construct the course, assignments and evaluations in a way that would create choice. Pratt (2005) also noted that while learner control is important, it is "not a sufficient condition for promoting independence" (p.131). He suggested "teachers need to help make learners aware of the strategies and approaches used in learning. Further, they need to help learners recognize the relationship between the strategies and learning outcomes" (p.132). As one of the teachers in this study noted, "we need to re-educate the students." It is also interesting to note that in the student focus group, one of the students talked about how his teacher would return an assignment of blueprint drawings with feedback and then allow a resubmission to correct errors. When the researcher explained that allowing the resubmission was another way of teaching the concepts involved in the task, because his doing the work would result in more learning, the student laughed and exclaimed, "oh, that's what he

was doing!" The research and this study both suggest that telling students the reason behind why the teacher does something in the class can be beneficial and possibly contribute to motivation.

Yet the research and this study both reveal significant issues around the motivation, self-discipline and time management of college students. The focus group participants in this study were all mature students, and they were generally satisfied with the blended learning approach and in fact, suggested further reduction in F2F time was possible and even preferable. The time management skills of students who are older, or have jobs and families, may be better because they have experience in juggling different demands. As indicated previously, the demographics of the student population were not known and it is difficult to determine if the survey or focus group were representative of the population.

Student Success

The faculty noted that the success rate for the class was not high, and they talked about the high number of students who handed in no assignments at the end of the year. It was their perception that students in the pilot did not do any better, and in some cases they did worse, than previous years. With the exception of two rare 100 per cent assignments and several students in the high 80s and 90s, the teachers indicated there was a larger number of students than in past years who didn't even hand in a culminating semester assignment or complete online quizzes that would ensure their success in the final exam.

The literature review included a few studies that link blended learning to student success as good as, and sometimes better than, a traditional face-to-face class or a totally online course. (cf. Kenney & Newcombe, n.d.; Lim et al, n.d.; O'Bannon et al, 2011; Cottrell & Robison,

2003). This study did not start out to measure student success and comparing the results to previous years is based on anecdotal evidence from teachers' opinions at the end of the year. It would be helpful for faculty to link student grades with the ages and backgrounds of the students, data that was not part of this research study, and it would also be important to compare the data to classes that were not blended.

If the success rate were indeed lower than previous years, it would not be possible to know for sure what factors were relevant. The reduced time in F2F was not fully implemented and after just one year, the impact of either the tablet or the learning management system would be difficult to link to student success rates. It can be difficult to make direct comparisons. It could have just been an off year, something that happens over the course of any program's life. Continued research into the implementation of blended learning will help to reveal the factors that can impact student motivation and eventual success, including the demographics and/or learning styles of students, the maturity of the students, the level of control a student feels over their education, the awareness of students concerning the reasons behind the developmental approach used in blended learning, or whether mobile technology plays a role.

Orientation

The importance of a solid orientation to blended learning, prior to launching a blended learning program, was highlighted by this study. The college involved in the study devoted one full week to student orientation and provided faculty with the iPad months prior to the launch, but the findings suggest more may need to be done, or an additional focus to the orientation may be required.

Preparing high school students. The findings are consistent with other research studies (Clark, 2011; Aycock et al., 2002) that suggest the younger, less mature students struggle with changes in the classroom. If preparing high school graduates is the concern, could a pre-college, preparatory session with possibly required attendance to obtain acceptance into the college address the issues? Watson (n.d.) described a mandatory course at Odyssey Charter Schools in Nevada where a Learning Strategies course "focuses on mandatory study skills and learning strategies" (p. 7). Would there be higher success rates if more time were given to explaining why, for instance, students will be asked to research their own answers, or why their professors will not be standing at the front of the classroom lecturing? When asked about the weeklong orientation held at the beginning of the school year, teachers and students in this case study talked about how the technology was introduced. The researcher did not ask directly whether blended learning was explained and whether the class was told how the roles of the teachers and students would change; however, the interview responses and focus group discussion around orientation tended to focus on orientation for the iPad and Desire2Learn. It might be that orientation also needs to focus on explaining what instructors will or will not be doing and why. College teachers often make decisions in their classrooms but rarely explain to students the reasons behind them. That can leave students feeling confused or unsupported and unprepared for their changing responsibility.

On the other hand, perhaps blended learning is not an ideal strategy for the first semester or year of a college program, and its implementation should be deferred to when students are more familiar with college expectations and have time to mature as a post-secondary student. Very often first year students who come directly from high school are still trying to determine if they are in the right program, and they will not have the commitment needed for blended

learning if they are uncertain about why they are in that class or what they want to do. The students who continue onto second semester or second year are usually more committed to the program and they can envision working in that career in the future. They have a better sense of where they are headed and that future goal can create the necessary motivation.

Preparing faculty. The faculty's description of their approach to teaching was consistent with the developmental strategy as described by Pratt (2005) and their philosophies about preparing students to be more responsible would appear to support a blended approach, yet a couple of the teachers did express the challenge they faced in letting go of the sage role. The fact teachers who are committed to the blended approach struggle with the changes it requires of them underlines the need to provide adequate teacher training and time to prepare. One teacher who was clearly comfortable with technology suggested s/he could have used more training in the learning management system. This is not too different from what other faculty have identified in the literature (Gliksman, 2013). Time to prepare and time to learn and be comfortable using the technology is important (Kahler, n.d.; Brown et al., 2004).

Other Common Findings

The findings indicate that the faculty felt a lot of time was required to implement a blended learning approach and that a course needs to be designed specifically for online instruction. These are consistent with research in the literature review (Albrecht, 2004). The study's findings and the literature review (Dziuban, 2004) also both suggest there can be some non-academic benefits to implementing blended learning, particularly saved classroom space in a crowded facility. The college's definition of blended learning as including a reduction in F2F time is also consistent with what the literature concludes (Albrecht, 2004).

Research Effectiveness

The choice of semi-structured interviews, an online survey and a focus group appeared to be appropriate methods for this case study. The semi-structured interviews allowed the researcher to ask different questions once it was learned the face-to-face reduction was not to be fully implemented, and it allowed the faculty to expand on related topics. This seemed to be the best method for learning about the teachers' perspectives. If the case study were repeated, it would be helpful to obtain more demographic information about the students, particularly how many of them came directly from high school and how many would be considered mature. While the survey did ask this question, not all students responded. If the make-up of the student population was known, this information might have provided more insight into the questions around student success and motivation to learn. The focus group seemed to be an ideal method to gather the student perspective and it reinforced and clarified some of the survey results, for instance around the question of preferences for F2F teacher lectures or video recordings. A larger focus group would have added more useful diversity in the discussions; for instance, it would have been helpful if younger students, recent high school graduates for instance, had also been represented. Also, it would have been helpful to know how reflective the participants were of the population. Future studies should also assess the learning styles of the student population so possible consistencies in research can be determined.

Conclusion

The case study helped to answer the question, how were teaching and learning perceived to be impacted by the choice of tablet in a blended learning program. The experiences of faculty and students in the mechanical engineering technician program were consistent with much of the

literature about implementing blended learning. The interviews revealed faculty concerns about their students' learning styles, what subjects should be taught online and what should stay in the classroom, the time to prepare, and - most notably - the lack of motivation and time management skills in their students. The choice of technology, specifically the iPad, was questioned, but the learning management system, D2L, was seen as positive by both teachers and students. Students offered some mixed reactions to the blended approach but did not express negative opinions about accessing content online.

The findings suggest that orientation for both students and faculty may be one of the most critical factors behind a successful blended program.

The case study design anticipated that the F2F time in class would be reduced at the start of the semester, but faculty decided to proceed with a gradual implementation. Thus, this study would likely not fit the definition of a more formal blended course since it was not fully implemented. However, others support this slow approach; for instance, Aycock et al. (2002) recommend that a school wishing to implement blended learning "start small and keep it simple" (p.2). A study into next year's experience in the mechanical engineering technician program, when the reduced time is scheduled so that students will have class time reduced and the ‘bring your own device’ rule results in a mixture of devices, would provide more insight into the questions posed in this study.

This study did suggest that the specific technologies, while important, are just tools; however, there is a question about whether the easy mobility of the iPad did result in some additional student-teacher engagement as suggested by one of the students. Would that have happened if it were a laptop that had been given to the students? The literature review suggested

engagement could increase in a blended program – how is that engagement tied to the choice of technology?

What remains are important questions about explaining to students the why behind the changes and the provision of adequate support for faculty. An important question would be whether the blended approach is best launched slowly so that students can build the maturity required to be responsible for their own learning and how that kind of slow launch could be structured. What are the differences between mature and less mature students and how would these potentially impact the launch of blended learning? If blended learning was delayed, until a second semester or second year, would that make a difference in student success? What and how to blend are also worth further research; for instance, research needs to delve more closely into specific strategies that teachers use, including what kinds of topics and lessons suit an online approach and what suits the F2F portion of the course.

This case study concludes there are a number of areas where additional research is warranted, including:

- if the implementation of blended learning were delayed until a later semester or year, how would student success be impacted;
- if orientation in blended learning strategies (and not just technology) were available for all students, would success be positively impacted (particularly for recent high school graduates);
- what factors are important in determining whether F2F or online is the best approach and how should these decisions be made;
- how does modality impact the success of different delivery approaches;
- what technology best supports a blended learning environment and how does the choice of technology (tablet versus laptop computer) impact student engagement;
- how are teachers maintaining contact and relationships with students in a blended environment; and
- how are teachers preparing to teach in a blended course.

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Appendix A

Faculty First Interview Script

Thank you for taking the time to meet with me.

Our interview is being recorded but I just want to remind you that this is to help me with transcribing what you tell me and the recording and transcripts will be destroyed five years after the research is completed, in compliance with proper research protocols. If you prefer that I don't use a recorder, I will just take notes.

1. Tell me a bit about your teaching career. How long have you taught, in what areas, and what types of courses? How long have you been at (this) college and how long teaching in this program?
    a. What courses do you teach to the mechanical engineering (ME) students.
    b. What else do you teach your students, apart from the content of your subject area?
2. How would you describe the philosophy that you bring to the classroom?
3. How would you describe the approach to teaching that will be implemented this fall?
    a. How do you think this approach will facilitate or detract from your philosophy?
    b. How do you think this approach will impact the 'other' things you teach your students?
4. How did this specific approach come about?
    a. What concerns have you had about the classroom that you think this approach addresses?
    b. Why do you think a different approach is being piloted?
5. When and how did the decision to do this get initiated - how long have you been talking about it?
6. What were the reasons for a discussion about changing approaches? What has prompted the change?
7. What did you think when the idea was first brought forward?
8. What is your motivation for using the technology and changing your approach?
9. How would you describe your teaching approach before this?
10. How technologically adept would you consider yourself? Own an iPad? Are you comfortable with the technology being used?
11. What excites you about this approach? Why or how do, you think it will work? What will be the benefits?
    a. Do you think students are bored with lectures?
    b. Do you think students will find the technology easy?
    c. Do you think students will find class time more effective?
    d. Do you think learning will be more effective, more individualized?
12. What concerns you about this approach? How do you think it will not work?
13. What do you think the students will, or won't, like about this approach?

    a. Do you think they will come to class prepared?
    b. Do you think they will take responsibility for their own learning?
    c. Do you think students will learn as effectively using the screen to access information?
    d. Do you think two hours of class time will be sufficient?
14. How much time have you spent preparing to change your approach to teaching this semester?
    a. How have you used class time in the past and how to you anticipate you will use class time with this method?
15. What theory(ies) in education, if any, have you read in preparation for this?
    a. Have you heard about the flipped classroom?
16. Is there anything I have not covered about this pilot project that you would want to speak to at this time?

Appendix B

Faculty Second Interview Script

Thank you for taking the time to meet with me again.

1. How did the semester go in your opinion?
2. Do you think the students learned as well as in the past, better, or worse?
3. What do you think went well specifically?
    a. Were you able to more or less effectively individualize your teaching?
    b. How did this method impact learning?
4. What do you think needs to be changed?
5. How was the iPad the right or wrong technology for this approach?
6. How was the LMS the right or wrong technology for this approach?
7. How successful were you in reducing face time with your students?
    a. Why or why not?
8. What were the benefits or drawbacks with regard to teacher preparation?
9. What were the benefits or drawbacks with regard to evaluation of student work?
10. What else do you teach your students, apart from the content of your subject area? How did this method facilitate or detract from this?
11. Now, what excites you about this approach? Why or how do you think it works?
    a. Did deeper learning take place?
    b. Did students take more responsibility for their learning?
    c. Did this method allow you to more or less effectively individualize your teaching?
    d. Did this approach allow you to achieve your goals as an educator? And what are those goals?
12. Now, what concerns do you have about this approach? Why or how do you think it will not work?
    a. Were students prepared for class?
    b. Was listening to or reading lectures on the screen a deterrent?
    c. Were more students reached, or did this method just help to reach different students?
    d. How much of that reduced class time of one hour, was used in student meetings outside of class?
13. Is there anything else you would add to this discussion concerning this new approach to teaching that we have not touched on yet?

Other questions will be developed based on the responses to the initial interviews and these will be submitted to the REB.

Appendix C

Student Survey Questions

Instructions: Please answer the questions honestly and to the best of your ability. There are no right or wrong answers as this survey is seeking your opinion. The survey is anonymous. Do not put your name or student number anywhere. This survey is about the pilot your teachers used in mechanical engineering program. It asks questions about the access to online resources, and the use of class time as part of this method of teaching.

1. **Did you enter the mechanical engineering program at (the college) directly after completing high school? (You completed high school in June 2012)**

   YES NO

   If you answered YES, proceed to question # 3.

2. **What year did you graduate from high school? _____**

3. **Since graduating high school I have (check all that apply):**

   Worked full-time and did not attend school _____
   Worked part-time jobs and did not attend school _____
   Attended another college program or programs at (this college) or elsewhere _____
   Attended university _____
   Looked for work but was unable to find a job _____
   Other (specify): _____

4. **If you attended other college programs, did those programs use iPads or any kind of tablet as part of the instruction?**

   YES NO

5. **Before I came to (this) College, I owned a tablet computer. (ie: iPad, Playbook, or any other kind of model)**

   YES NO

6. **Have you taken courses where technology was used, at least for part of the course, to replace an instructor's lecturing at the front of the classroom?**

   YES NO

7. **If yes, please describe your experience.**

8. **During this year at (this) College, when course resources (such as Power Points, lessons, video, readings etc.) were available online, it was possible for you to learn the material without direct instruction from the teacher.**

   YES SOMETIMES NO

9. **During this year at (this) College, class lectures were reduced as a result of the resources that were available online.**

   Strongly disagree, Disagree, Not sure, Agree, Strongly agree

10. **During this year at (this) College, you used the iPad to access online resources across all of your courses on average this many times:**
    Daily
    Regularly (1-3 times a week)
    Rarely (1 -2 times a month)
    Never

11. **How did you access the online resources?**

12. **The intention of the iPad pilot at (this) College was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom. Which aspects of the pilot worked well and why?**

13. **The intention of the iPad pilot at (this) College was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom. Which aspects of the pilot need to be improved and what suggestions would you make to improve them?**

14. **Consider the description o the pilot project in the previous question and then think about the last time you were in school before coming to this program. Compared to your last school experience, do you think that in this past year at (this) college, you learned, in a comparable amount of time (choose one)**

    Much more material
    Somewhat more material
    The same amount of material
    Somewhat less material
    Much less material

15. **Rate the effectiveness of the following methods of learning.**

    iPad

Very effective	Effective	Neutral	Ineffective	Very ineffective
1	2	3	4	5

    D2L learning management system

Very effective	Effective	Neutral	Ineffective	Very ineffective

1 2 3 4 5

E-textbook
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

Online lessons and reading material
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

Teacher lectures in the classroom
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

Hard cover textbook
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

Quizzes in the classroom
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

In-Class exercises or problems
Very effective Effective Neutral Ineffective Very ineffective
1 2 3 4 5

16. **In those courses where your teacher did provide course material online, how much time did you spend each week BEFORE class preparing to attend class accessing new course material provided by your teacher online? This would be per course, per week, on average**
    Less than 15 minutes
    Half an hour
    45 minutes
    one hour
    an hour and a half
    2 hours
    More than 2 hours

17. **In those courses where your teacher did provide course material online, how much time did you spend each week AFTER class reviewing online material or working on assignments or lesson material provided in class. This would be per course, per week, on average.**
    Less than 15 minutes
    Half an hour
    45 minutes
    one hour

an hour and a half
2 hours
More than 2 hours

18. I came to class prepared for quizzes and practice exercises

Never
Sometimes
Usually
Always

19. Since September, I have met face-to-face in a one-on-one meeting with my teacher outside of class time

Never
Once
Twice
Three times
Monthly
Weekly
More than once a week

20. If given the choice, I would prefer to (choose one)

Listen to my teacher lecture in the classroom
Listen to an audio recording of my teacher's lecture while I view PowerPoint slides posted online
Listen to and watch a video of my teacher giving a lecture online

21. If given a choice, I would prefer to read (choose one)

an e-textbook on screen
hard text book in print

Thank you for taking the time to respond to this survey. Are you interested in the focus group? Would you like to say more about the iPad pilot and how it impacted your learning? If you would like to participate in a focus group as part of this research study, please send an email, separate from this survey, to the researcher, Kim Denstedt, at kdenstedt@conestogac.on.ca indicating you are a (this college) student and would like an invitation to the focus group. Include your name and the email address you would like me to use for the invitation. The invitation will include where and when the focus group sessions will be held. You are free to accept or decline the invitation at that time. The session will include lunch and gift for your participation. I will accept the first 12 applicants who email me.

Appendix D

Focus Group Questions

Facilitator: Welcome to our focus group. My name is Kim Denstedt and I am conducting this research for my own school project. It will help me to earn my master's degree. I am also a teacher at Conestoga College in Kitchener and I appreciate (your) College allowing me the chance to conduct this research here. Thank you for taking the time today to help me with my research project. Please feel free at any time to get up and help yourself to the lunch on the table.

First of all, I would like to remind everyone that it is important to keep what is said during this session, and who participates, confidential. Please don't discuss this session elsewhere. There are no right or wrong answers here. If you disagree with what someone says, please express your opposite opinion respectfully.

The information letter about the research was distributed to you with the invitation. I have copies here as well for you to read. You have all accepted an invitation to participate but at this time I would like to ask you to read this sheet and then sign your consent to be involved in this research.

You should know that you are free to not answer any questions, and you can leave at any time; however, any comments you made up to that point cannot be removed since separate comments in a discussion that includes many people cannot be separated.

While your comments may be included in the final research report, you will not be identified as having made the comment. You will only be referred to as a focus group participant, or a student. You will not be identified by name, student number, of even physical description. Your teachers will not be told who participated or who did not participate in this session.

We are being recorded today but these audio recordings will only be listened to by me. According to proper research protocol, the recordings will be destroyed after five years. In the meantime, they will be kept under lock in a cabinet in my home office.

Today I will be asking you some questions and what I hope is that you will discuss what you think as a group. You are not required to reach an agreement as a group – you can have differing points of view. I encourage each of you to engage in the discussion.

Are there any questions that you have for me before we get started?
(Let's begin with introductions)

1. Your teachers tried a very different approach to teaching you this year. How would you describe the approach?
   (Rather than spend time lecturing you in class, they tried to transfer many of the resources you would need to study to understand concepts to an

electronic format for you to access on an iPad. Then, they reduced the time in class from 3 to 2 hours.)

2. How was it different from what you have experienced in school before and what was that experience in comparison?
    a. Do you think you learned the same, more effectively, or less?
    b. Did you learn more material, or less, or the same amount if you were to compare this to past classes?

3. Did you like or dislike this approach and why?
    a. Did you like the reduced number of lectures?
    b. Did you like accessing information online?
    c. Did you like the reduced time in the classroom?

4. Do you feel you learned the concepts that you needed to learn in first semester?
    a. Describe how you learned the concepts – how did you approach your classes and online resources?

5. How was accessing the information on an iPad? Was it easy? Was the Learning Management System (E-class) system easy to access?

6. What kinds of information were you required to access on-line?

7. How much time did you spend outside of the two-hour class time reading and accessing on-line resources? How does this compare to your past educational experiences?

8. Were students generally prepared by the time they got to class?

9. How often did you meet with faculty outside of the two-hour class time for help with accessing information, or for understanding information compared to your past experiences?

10. How was your class time spent?

11. How do you feel about how class time was spent?

12. How often did your teachers lecture?

13. Why do you think some lectured more, or less?

14. In summary – what was the biggest issue, what aspect was most successful?

15. Is there anything else you would like to say about the method of teaching used this year in this program that we have not touched on yet?

Appendix E

University Approval

Notification of Approval

Date:	August 17, 2012
Study ID:	Pro00032544
Principal Investigator:	Kim Denstedt
Study Supervisor:	Stanley Varnhagen
Study Title:	How reduced face time with faculty, through the use of tablets, impacts learning at a community college
Approval Expiry Date:	August 16, 2013

Approved Consent Form:	Approval Date	Approved Document
	8/17/2012	Consent form for student focus group
	8/17/2012	Consent form for faculty

Thank you for submitting the above study to the Research Ethics Board 1 . Your application has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Sincerely,

William Dunn, PhD
Chair, Research Ethics Board 1

Note: This correspondence includes an electronic signature (validation and approval via an online system).

Appendix F

College Approval

PRINCIPAL RESEARCHER	DEPARTMENT	NUMBER
Kim Denstedt, Professor	School of Media and Design, Conestoga College	RA 08.23.12

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT

Mohawk College of Applied Arts and Technology STARRT Campus

CO-RESEARCHERS

None

SPONSORING AGENCIES

None

TITLE:

How reduced face time with faculty, through the use of tablets, impacts learning at a community college.

APPROVAL TYPE:	APPROVAL DATE	TERMS (YEARS)	AMENDMENT	AMENDMENT APPROVED	ANNUAL REPORT/ RENEWAL DUE DATE:
EXPEDITED ☒ FULL ☐	August 23, 2012	1.5 years			December 23, 2013

C. L. Jensen

Approval of the Research Ethics Board by:
Cheryl L. Jensen, M.Ed
Chair

This Certificate of Approval is valid for the term provided there is no change in the experimental procedures.

Appendix G

Faculty Information Form

Study Title
How reduced face time with faculty, through the use of tablets, impacts learning at a community centre.

Background
I have been researching the use of technology in post-secondary classrooms and how teaching methods are changing in response as part of my post-graduate studies. I am also a college professor at Conestoga College who understands the classroom and the desire to enhance the learning and teaching environment for all. I am interested in the planned use of tablets in your program area, and in the strategy to reduce face-to-face time between faculty and students.

Purpose
The purpose of the research is to look at a new approach to teaching – it is not research about you but is about the method that you are using to teach in your program in the 2012 -2013 school year. The intent is to answer the question how do faculty and students describe the benefits and drawbacks of reduced face-to-face time between teachers and students through the use of tablets.

A primary purpose of this research is to support partial fulfillment of a Masters of Arts in Communication Technology from the University of Alberta for the researcher.

Benefit
Many college teachers are interested in learning how technology, such as iPads, can be used to change how students receive course content and how that impacts teaching and learning. The research from this study could possibly contribute to understanding more about this approach to teaching and will provide a summary of faculty and student feedback for your own purposes. This is a chance for you to add to the growing body of research about how technology is best used in the college classroom.

Study Procedures:

1. I will invite all six teachers in the program to be interviewed in August 2012 before the start of school and again in January 2013.
2. A listserv will be created by Mohawk College and my materials will be sent out to faculty through this. Faculty who want to accept the invitation will then contact me directly.
3. Each interview will last approximately 1 ½ hours and will take place on Mohawk's campus or another location if preferred by the teacher. The total time commitment for this study would be 3 hours if a teacher participates in both interviews.
4. A summary of your interview(s) will be shared with you, as a check, prior to completion of the final report.
5. I will invite all students in the first year of the program to complete an online survey. With permission from the instructor, I will visit the class to explain the research and to ask for their support before sending the survey to their emails.

6. The survey will ask students if they would participate in a focus group and to provide their email if they are interested. Then, I will select a small sub set of students to participate in a focus group. Those students will be invited to the focus group session through the email they provided in the survey. The focus groups (maximum of two groups with between 4 and 6 students each) will be held outside of class time on Mohawk College campus, the specific time and location to be announced in the invitation.
7. At the beginning of each interview, teachers will receive a $15 gift card that can be used at Chapters as a thank you ($30 total for both interviews). At the end of the focus group session, students will receive a $10 gift card that can be used at Tim Horton's as a thank you.

Confidentiality and Anonymity

8. The survey will be anonymous.
9. Faculty interviews and the focus group sessions will be confidential.
10. The interviews and focus group sessions will be recorded.
11. The focus groups will be held at a time and location where teachers will not be present. The interviews can be held on campus, or off-campus if a teacher prefers.
12. At no time will college employees or students be told who accepted or declined invitations to participate or any raw data collected.
13. The final report will include student comments from the survey and the focus groups, and faculty comments, but no names will be linked to those comments other than as "a student" or "a faculty member" or "teacher."
14. Students and faculty may request a copy of the final research report that I anticipate will be completed by August 2013, by contacting me.

Voluntary participation

15. Your decision to participate in this research is voluntary.
16. You may choose to withdraw from the interviews at any time.
17. You will have two weeks after each interview to withdraw your comments from the study.

Risk

18. Because of the small nature of the community involved in this research, I cannot guarantee total anonymity of the faculty.
19. I do not believe there is any risk to you to be a participant in this study.
20. The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and the Research Ethics Board at Mohawk College. If you have concerns about this study, you may contact the Research Ethics Office at University of Alberta 790-492-2615 or the Research Ethics Board contact at Mohawk College, Donna Rawlins at 905-575-1212, ext. 26813. These offices have no direct involvement with this project.

Research Investigator:
Kim Denstedt
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Email: stanley.varnhagen@ualberta.ca

Appendix H

Student Survey Information Form

Study Title
This form outlines the details of a research study titled "How reduced face time with faculty, through the use of tablets, impacts learning at a community centre."

You are being asked to complete this survey because you are a student in the first year mechanical engineering program at Mohawk College.

Purpose
The purpose of the research is to look at a new approach to teaching – specifically it is about the method that teachers are using to teach in your program in the 2012 -2013 school year. The intent is to answer the question, how do faculty and students describe the benefits and drawbacks of reducing face to face time between teachers and students through the use of tablets.

The research will also support partial fulfillment of a Masters of Arts in Communication Technology from the University of Alberta for the researcher.

Benefit
The research from this study could possibly contribute to understanding more about this approach to teaching. It could directly impact the plans of your teachers in the future, but it could also affect other teachers at other colleges who are also interested in the topic. There is no direct benefit to you. This is a chance for you to be a part of a study that could contribute toward a better understanding of how technology can change the learning environment for college students. Many college teachers are interested in learning how technology, such as your iPads, can be used to change how students receive course content and how those changes impact teaching and learning.

Study Procedures: This is how the survey will be conducted:

1. I am inviting all students in the first year of the mechanical engineering program at Mohawk to complete this online survey.
2. The invitation will come in your college email with a link to the survey. I do not have your emails. Mohawk College will create a listserv and send you the information.
3. The survey has 7 questions and should take about 15 minutes to complete.
4. The deadline to respond to the survey is (tbd).
5. The survey will invite you to send me your email so that you can receive an invitation to a focus group session.

Confidentiality and Anonymity

6. The survey will be anonymous. Do not put your name or student number anywhere on the survey.
7. The final research report may include comments from the survey but no names will be linked to those comments other than as "a student."

8. If you send me your email for a focus group invitation, it will only be used to invite participants to the focus group
9. Students may request a copy of the final report, using the researcher's email. I expect that my report will be done by August 2013.

Voluntary participation

10. Your decision to participate in this research is voluntary and whether you participate or not, will not have any impact on your grades.
11. You will decide if you want to complete the survey, but once it is submitted, your data cannot be withdrawn because the data is collected anonymously. The comments will become part of the study and may be used in the report.
12. When you submit the survey you are giving consent to participate in this research.

Risk

13. I do not believe there is any risk to you to be a participant in this research.
14. The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and a Research Ethics Board at Mohawk College. If you have concerns about this study, you may contact the Research Ethics Office at University of Alberta 790-492-2615 or the Research Ethics Board contact at Mohawk College, Donna Rawlins at 905-575-1212, ext. 26813. These offices have no direct involvement with this project.

Research Investigator: Kim Denstedt
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Appendix I

Student Focus Group Information Form

Study Title
This form outlines the details of a research study titled "How reduced face time with faculty, through the use of tablets, impacts learning at a community college."

You are being asked to participate in a focus group because you are a student in the first year mechanical engineering program at Mohawk College.

Purpose
The purpose of the research is to look at a new approach to teaching – specifically it is about the method that teachers are using to teach in your program in the 2012 -2013 school year. The intent is to answer the question, how do faculty and students describe the benefits and drawbacks of reducing face to face time between teachers and students through the use of tablets.

The research will also support partial fulfillment of a Masters of Arts in Communication Technology from the University of Alberta for the researcher.

Benefit
The research from this study could possibly contribute to understanding more about this approach to teaching. It could directly impact the plans of your teachers in the future, but it could also affect other teachers at other colleges who are also interested in the topic. There is no direct benefit to you. This is a chance for you to be a part of a study that could contribute toward a better understanding of how technology can change the learning environment for college students. Many college teachers are interested in learning how technology, such as your iPads, can be used to change how students receive course content and how those changes impact teaching and learning.

Study Procedures: This is how the study will be conducted:

1. Students will be invited through a survey to provide me with their emails if they are interested in participating in the focus group. The emails will only be used to invite participants to the focus group
2. I will randomly select a sub set of participants from the students who express an interest in participating in the focus groups. Depending on how may students express an interest, you may or may not receive an invitation.
3. The focus groups (a maximum of 2 with between 4 and 6 students in each) will be held on Mohawk College campus in March during lunch time, the specific room location to be announced in the invitation. The focus group discussion will be one hour in length. Lunch will be provided.
4. A student can decline the invitation to participate; if that happens, a replacement may be sought.
5. Students will receive a $10 gift card to Tim Hortons for their participation at the session.

Confidentiality and Anonymity

6. The focus group session will be recorded so that I can ensure accuracy when compiling my final report. The recording is destroyed at a later date.
7. The focus group sessions will be held at a time and location where your teachers will not be present. At no time will faculty be told who was invited to participate in the focus group, or who did or did not participate in the focus group. The researcher will not communicate the source of student comments in any manner to faculty.
8. Students will not be identified in the report. The report may include comments from the survey, or comments from participants in the focus group, but no names will be linked to those comments other than as "a student." At no time will I discuss or share the raw data from the focus groups with others.
9. Students may request a copy of the final report, using the researcher's email. I expect that my report will be done by August 2013.

Voluntary participation

10. Your decision to participate in this research is voluntary and whether you participate or not, will not have any impact on your grades.
11. You may decline the invitation to participate in a focus group.
12. You are free to not answer any question once you are in the focus group, but once you have made a comment it will not be possible to withdraw it because of the nature of focus group discussion. You can choose to leave the focus group at any time, but comments you make during the session cannot be withdrawn because of the integrated nature of focus group discussions. Withdrawing any one student's comments could remove the context of other student comments and the discussion can't be separated.

Risk

13. I do not believe there is any risk to you to be a participant in this study.
14. The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and a Research Ethics Board at Mohawk College. If you have concerns about this study, you may contact the Research Ethics Office at University of Alberta 790-492-2615 or the Research Ethics Board contact at Mohawk College, Donna Rawlins at 905-575-1212, ext. 26813. These offices have no direct involvement with this project.

Research Investigator:

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Appendix J

Consent Forms For Faculty And Students

Faculty Consent Form

- I agree to participate in an interview conducted by Kim Denstedt concerning the iPad pilot project in the mechanical engineering program at Mohawk College. The first interview will be conducted in August of 2012 and the second interview will be conducted in April 2013.
- I have read the study procedures provided in the Faculty Information letter.
- I understand that I have been invited to participate and could choose to not participate in either or both interviews.
- I understand that I may withdraw from either interview at any time.
- I understand that I have two weeks from the date of the interview to request that my comments be removed from the study.
- I understand this interview is being recorded.
- I understand the plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and a Research Ethics Board at Mohawk College. If I have concerns about this study, I may contact the Research Ethics Office at University of Alberta 790-492-2615 or the Research Ethics Board contact at Mohawk College, Donna Rawlins at 905-575-1212, ext. 26813. These offices have no direct involvement with this project.

_____

Printed Name

_____ _____

Signature Date

Student Consent Form

- I agree to participate in a focus group conducted by Kim Denstedt concerning the iPad pilot project in the mechanical engineering program at Mohawk College.
- I have read the Information Sheet for Focus Group Participants.

- I understand that I have been invited to participate and could choose to not participate.

- I understand that I do not have to respond to every question asked during the focus group.

- I understand that I may withdraw from the focus group at any time.

- I understand that the researcher cannot guarantee that any comments I make will be withdrawn from the focus group, even if I leave the group.

- I understand that I have been asked to keep what is said, and who says what during the focus group session, confidential

- I understand that while the researcher has asked all focus group members to keep the discussion confidential, that she can't prevent a member from talking about the focus group after it is completed.

- I understand the focus group session is recorded.

- I understand the plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta and a Research Ethics Board at Mohawk College. If I have concerns about this study, I may contact the Research Ethics Office at University of Alberta 790-492-2615 or the Research Ethics Board contact at Mohawk College, Donna Rawlins at 905-575-1212, ext. 26813. These offices have no direct involvement with this project.

_____

Printed Name

_____ _____

Signature Date

Appendix K

Pre-Launch Teacher Interviews

Re: teaching philosophy or what do you teach other than the content of your course?

- A favorite quote of mine is by Oscar Wilde– we teach our students how to remember but we don't teach them how to grow, and, my goal is to help my students to grow and to encourage life long learning and the broader aspects of communication. We can teach some of the bare essentials - how to write and speak properly. But it can be difficult to know what they will need in the work world. I like to speak to each of my students individually and get to know them to determine what they need. And to foster some learning. And growth.

- At least what I try to teach, and this is paramount and I always tell them this, is I want to teach them how to think. And I think in the past the traditional way of teaching was sort of by rote and now, I tell them the most important asset they can bring to any company in this field is the ability to trouble shoot and solve problems and think fast and think on their feet and know where to go for resources.. in other words utilize all the abilities and resources they have to be a problem solver.

- I had a young man, obviously must have just got a phone because last year he was not like this. I was asking some definitions and he was coming up with these cool definitions that was not who he is - I looked around and he's got his phone but he was hiding it from me, and I said, why? If you need to find a definition, you have the world at your fingertips, let's use it. I am convinced that by using the technology the students will learn better, they will learn faster, they will understand research. They will learn having to dig because I never- we never had that technology 40 years ago. We had to go to the library, or phone people.

- I've interviewed employers myself -what are your expectations when you get a graduate. What are the key elements here, besides what they call the basic tools - being able to measure, read drawings, the building blocks of any trade, they want this person to catch on, be a fast leaner, and understand. So that is where I try to focus. Less and less hand holding as we go along. Why don't you tell me the answer, because you'll forget if I just tell you the answer, maybe you find the answer and then it will sink in, longer.

- I am the type of guy that would prefer not to give the students the answers. I will answer questions with questions. I will give direct content, there it is, and the old sage on the stage theory - that is what we have done all these years. Now with D2L we can give them that content ahead of time and then, now let's apply it. I'd like to be able to, you have the knowledge, you read it, you have the information, let's apply it and if you get stuck, come see me. And we will sort it out. I tend not to give them an answer. I had a student one day say 'stop answering my questions with questions…you are my teacher

and you have to tell me', and I said, well, I'm afraid I don't, so here is another question for you'. I would rather that they learn on their own, because if I tell them they will forget, guaranteed, we all know that.

- But now what I like about this iPad project, is, I can say I am talking about relief valves today - what is a relief valve - some guys won't have a clue. You have your iPads, go for it, I give you 15 minutes, give me all the feedback what is a relief valve in the system, what does this do in the system. So, I am pumped about using the technology they have.

- Obviously having equality in the classroom and access in the classroom. Access, equality and learning from experience, experiential learning would be the three pillars of my philosophy.

- I'm more of a let's do something - hands on - I might try to explain something but then let's use it as quickly as we can and master some. Like what we are doing here in our program is very hands-on as well, it not so much theoretical knowledge at the college level. We like to think of ourselves as doing something, learning some skills.

- My philosophy is that all learning isn't attached to a grade. Most of our important learning actually happens outside of exams and that comes from experience, actually hands on, getting out there, engaging the community, or actually working through real world problems you are going to encounter when you are done school. And that is real learning. I can get as many multiple choice tests as I want it's not going to prove I can go out and engage and evaluate and critically assess the real world.

- I have a lot of students I think lack confidence and I try and show them that they are capable of doing whatever has to be done. At least that's what I try to do. Not always successful. Have some students that I know are capable and yet they lack that little bit of self confidence. And I've seen them walk away from a diploma or the end of a semester. Just the wrong time. So that's important. I am not much of a lecturer.

Re: what is driving the pilot use of the tablet and the move to blended learning?

- The time and place freedom of online learning is great.

- Well technology based, so this is, it's here, it's not even the future. The college has chosen this program as a pilot to find out how quickly we can move into what is considered to be what the future of education is going to be.

- The mandate from the board is to allow the students to learn anytime, any place, anywhere. When ever they can. Because they are busy. No doubt about it. A lot of my students work full time. So I think that's a driving factor. Students are saying "I would really like to have that opportunity."

- The iPad is certainly a skill you can put on your resume. Maybe that will make the difference.

- I think there are two reasons; primarily for the last three or four years, or longer, this particular program has been struggling to say alive. Getting enough students in, to keep it going. I think this is partially a strategy to try and boost it. Also, 60 students is where we have been hovering for the last few years and that's a manageable amount of students for a pilot program.

- Can see immediate benefits for, maybe not for me and my students, but now suddenly I have opened up hours in a crowded campus – where I didn't have enough open classrooms. Now, I got half an hour from this person and this person and that and, look I have I have an empty room for two hours. Move something else in.

- As far as the iPad pilot, I have done some research for that team in industry, I have talked to, mind you it's not a very good sample, but I have talked to about four or five people, companies, that are our customers, and said, this is what we are doing. Are we crazy? Are we wasting the students' time and our time and money- and they say, no, because even if it's for note taking, even if it's for picture taking; I have a failure and I take a picture of it and I can go back and I have a record of it.

- They want to reduce the use of classroom space. If they turn all their courses that were once - if 100 per cent of their courses to 50-50, to 50 online and 50 face to face, then that allows them to double classes that are delivered, double classes delivered, doubles the students.

- We are trying to get our students a little bit more ready for actual use in real life - they are going to be using this stuff - it is being used in industry already - it is growing, whether we like it or not.

- I was in a small restaurant in Parry Sound out on a lake and the waitress used a tablet to send her order to the kitchen and for billing. I think it is what's going to happen. We are going to do it in industry. Lets get on board.

- This is really the first full-blown time that we have really engaged (in D2L), because it was mandated by the college. There's still a lot of people in the school who do not use a learning management system - we have more or less been mandated, the whole school has, but we have bought in. That's why we were selected for this iPad project, there's only four of us, we all use it, and we are all engaged fairly heavily in D2L. That's why they chose - one of the reasons they chose us.

- Well, one of the things we wanted to do was save the students a little money. That's always an important thing to do. I don't know how many textbooks I bought ... that I never had time to read. I've got a bookshelf of books in pristine condition. And I've take lots of courses in the past where they said you have to have this book and yet the

professor never opened it, never referenced it, or never used anything or they just use one or two chapters and you know for a $150 investment, so I am very anti textbook.

- It will be a great note taker, a picture taker for that kind of stuff. …. I was in a small restaurant in Parry Sound out on a lake and the waitress used a tablet to send her order to kitchen and for billing. I think it is what's going to happen. We are going to do it in industry. Lets get on board.

- I've always steered clear of textbooks if I could. There's the odd textbook I think is still a good investment, but most of the courses I have done, if I had a textbook the first year, I probably wasn't using it the second year. I would develop power point presentations, tutorial videos, and material from scratch rather than the textbook.

- I have just ordered some brand new equipment to update our hydraulic shop, we call it data acquisition, it's electronic equipment that monitors pressure flow, temperature, rpm, those kinds of things, water content, and you put it into ... and it will Bluetooth out… to a tablet. An example, these big windmills you see along Lake Erie. A lot of the controls are on top, a 300 foot climb. Talk to the maintenance guys and its about 45 minutes up and about 45 minutes down. Because he is latched in - it's quite a hike up. Imagine if you can stand at the bottom of the tower, punch in… blue tooth information.. the information that is on that machine .. and you've got it on your tablet. Already they are doing it.

Re: technology

- I was sent to (a) conference and the students all agreed it was just awful to watch a professor at the front of the room stumble with technology - I don't want to do that. I want to make sure everything works before I go in. I heard that last week there were about three things that went wrong and these were things I was planning on doing myself in class. I want to be ready for that.

- It's a compatibility issue. It only opens specific types of videos - flash doesn't work at all. So, any website I have created for my classes, even some websites are not tablet friendly, so if I direct them to go visit a website, it's not going to show up or it won't work properly for them.

- The only thing is, with these particular iPads, they are not 3G, so you need to find WIFI to get online.

- In fact Apple came in to speak to us all and admitted and said, this is not the substitution for a computer. You still have to have a computer. This is a car and a computer is a transport truck. This can't carry or do anywhere near as much as your laptop. You still need a computer. There are other limitations with this too.. Because it is Apple it does not work with a lot of Microsoft, flash adobe, and we have had to do a lot of work around things. There are certain things this will not do that other tablets will. It was decided it would be the iPad and we said ok, but now we have to deal with the limitations.

- So, we get them set up on the wireless. The way we have wireless here now, I have to keep logging into it about every 20 minutes. If I'm a student here, I want to do it like I do at home. When I walk into home, it says, ok, you're back, here, I'm going to connect you to your wireless. If, at the most, one sign-on a day then I'm good for the day. They have done something to accommodate us because we fought this too. Because if I am using this all day, I don't want to have to keep logging back into the wireless every 20 minutes, it was crazy. So, they have done something different just for this project. That's why we need them in the lab to get them set up. They all have a special password and it connects them a little differently. The rest of the week, Andrew is coming down to give them three to four hours of e-Learn (this is the acronym that the college uses for D2L). He's going to do an eLearn piece with them and the Apple people are coming in for almost a whole day. It's a slightly different tool to use and there are some little tricks that hopefully we will all master. Then we have on the Thursday afternoon and Friday, we are each going to split up the time and we will do something where we use this (iPad) and apply it to our course area.

- Yes and I think that is the biggest thing is having all your ducks in row for the infrastructure. That's huge. We loaded that one morning, when we got it running, we loaded 47, 48 iPads simultaneously. They watched it up top. Didn't crash it. Slowed it down. But it didn't crash it. That will be the biggest thing, is, I am going over to another lab in another building. What is the hub like there - what is the system like in there? They have a lot here but do they have it there? I have a group of 15, it should be about 20. What happens when they all load up, when they all come online? Will they all come online at the same time in the future, maybe not - so my biggest thing is the idea of infrastructure.

- The motivation behind it was. You are the ones to do it. We decided this would be the perfect group, we are small, only really 4 plus 1, (teacher's name) from another department is teaching English, but part of the group, so there are 5 of us. Most of us are pretty tech savvy, have been, we have been moving along, I would say ahead of the rest of the college in terms of using blended learning, using the technologies.

- So the whole thing is, don't just jump in and use everything, the whole arsenal, and then where is the content. Try and find subtle ways that don't overwhelm them, that don't detract too much from what you are really trying to accomplish in those two hours and then, slowly get people used to the idea.

- I can see it being incorporated, I can't see it driving face to face reduction. When I was creating my course I was trying to figure out ways, how can my students use this tablet, to complete their off-site duties. But it's like, in order to use the tablet I have to create an assignment for them to do and in order to create that assignment I have to make sure that the iPad is capable of handling that. In my class the iPad is not capable of handling everything a computer can. Doesn't handle video very well. It's really unstable with the Internet.

- But the idea, or the reality of how the tablet was being used wasn't necessarily carried over into the pilot. Now it's become this thing that can teach students, or aid in teaching students, rather than saying, this is a cool tool to keep people connected, through email instantly, taking pictures, taking rough notes. Now it is being seen as this computer.

- So, do I see it driving reduction in face to face – no. Can it aid reduction in face to face? If the course is created specifically for the iPad, sure. I have courses that are 100 per cent online and I open the course on the iPad and nothing works. None of the videos, none of the apps, none of the presentations that are imbedded did not show up because the iPad can't handle it.

- I am going to take this really slow in the beginning because I have to for my own sake. Because I want to see how things are going to crop up, and develop, and progress, and hopefully evolve through that process at what I consider to be a reasonable pace.

- For this course, we are following the same format as for many other communications courses, but I will be using the iPad to enhance certain materials. It is ultimately a writing course. From what I understand of the research, iPads are not a great tool for writing, but a good research tool and I am going to see how we can best use that.

- They (students) can't just be anywhere. They have to be in their house or somewhere that has a hot spot. Because we don't have the 4g versions, we only have the Wi-Fi versions. So, that really limits where they can do their work. It's not like they could…well, I guess they could but it would be a giant pain to take their tablet to a coffee shop to type a report. They would more likely take their laptop. Which Apple explained to us, they have to have, in order to run the iPad, they have to have a computer that it connects to.

- My philosophy still is that our students will tell us how they are going to use it after they graduate. I can't possibly teach them that. Because this is going to evolve, let's face it this will be somewhat obsolete in the three years, because we have a one-year co-op, as part of the program - makes it a three year - it's a two year with a one-year co-op. Actually they have 16 months of co-op, but there's one full year when they go out in January and come back the following January, and during that time I am going to ask them to find ways to use this and to report back. And say here is how we are finding uses. I'm not too worried about that. I think a lot of this should be more student driven, I think a lot of this should lean more to the student driving it forward.

- The way the pilot came to fruition is we had industry guys in the school and they noticed that they all had iPads and they were taking brief notes, and some of the management figured if they are going to use it when they graduate, we might as well teach them to use it before they leave.

- With the tool itself, I think it depends on what we provide the students with the tool. I don't think it is so much the tool itself, the tool itself is a convenience, and it's a

portability issue, but it's more the content we put in there and how we use the learning platform and the quizzing that's going to make it a positive experience.

- But this is a very portable access device to that material. So I don't think it is really changing my material or my delivery so much although there are some tools here that I haven't started to use yet but I am hoping in the classroom one of the things I plan to use more, because it is so instantaneous and while I still have them in the classroom, ok we have just talked about this, let's have a quick quiz.

- No, it's great, because for me even before this came along, of course we've had computers for ages and we've had the ability to do research on the Internet – that's all you are going to do on here, just another way of accessing the Internet, but again it comes down to making sure they are doing the work and they are doing the research, and they start to get the idea that they have to do this in order to succeed. It's really up to them to have that self-discipline.

- The students were easily adaptable but one of the other problems at the college was we had about five or seven different systems, FirstClass, Web CT, we had the math department had something they designed on their own and students were signing into as many as four or five different system in one day and we had this other system called Mocomotion which I never liked, I would go into it once a year.

- From a tech savvy point of view, yes, I am tech savvy, I think there's a lot of technology out just for the sake of technology and isn't all that useful so let's find out from everyone and then package it ourselves, this would be a good app to have and or this would be a good thing to do or this would be a good way to use it so I think it is just a way of discovery through the whole process.

- It's a very sophisticated chalk slate. So that's where I think the big problem is going to be is, again, how disciplined are they going to be with this thing, are they going to be sitting there playing angry birds all through class and so on; I don't know how we are going to deal, or they can't log on - you know, so I'm - I can only do so much, we do have a guy who's going to be sitting in their theory classes, because all their theory classes are together, we're going to have a guy in the class, a tech guy during the whole class and if something goes wrong I can point to him and I don't have to concern myself with it, we made that point, it's like I have to teach - I only have this much time.

- From the philosophy point of view, it's making sure you know you understand where the resources are. Now we have a lot of massive open online courses, called MOOCs, we have webinars, we have open access from universities, colleges, so the basis or the base of where typically you would have library resources to go from, it has expanded exponentially, but that can be daunting too, where do I look, the sea is vast. That's where I see the challenges, but again, I think it should be driven by the student, or as a whole driven by the class. If I put it out there, and say for this week's assignment, get on YouTube or get on any of these open online courses, see what you can find out about the topic, specifically on this and if there is anything you can find, nothing too big, cause if

you get something on You tube, you don't want it more than a couple minutes long and so on - and use that as a sort of broadening of - instead of me shooting out like a laser beam, this information it now is coming in as an organism in the classroom, that's the way I am hoping it's going to evolve. I am just the guy at the steering wheel.

- I think the fact they can login and do stuff on their own, makes it individual. They will get more one-on-one time I am unable to give them. The other thing too, that I haven't done a good job at, is building things into the learning platform so I can get some early intervention. I would like to have a quiz set up so that if you have not answered it by a certain day you get an automatic email saying I see you have not done the quiz, do you need some help. Or if they have not done something else, or watched any tutorials. I know some students work 40 hours a week and maybe you don't have time to watch them, but I am concerned your success is not going to be, and to be able to hit them within the first or second week, because I do care but I don't have time to - sometimes by mid-semester I'm just getting a sense this guy is not doing anything and then it is almost too late.
- Yes. So we're all kind of slowly getting a feel for it. We have been using the iPad for months now. We are finding out what its abilities and its limitations are. We were told the key elements behind this are how it is going to be used in the classroom and how it is going to be used after they graduate.

Re: Preparation and lesson planning

- It's a ton of work. Which is why, right now, it has been a bone of contention across the colleges, the work formula, your swiff, does not take into consideration all of this. Sure, maybe down the road, there will be less. But I have a hard time believing that because the expectations are that you will have to continuously, the evolution has to be continuous.

- Not so much for me because I have done all this stuff online as much as I could in the past and with no textbooks. Some of the other instructors have relied heavily on textbooks. We decided to get an e-version of just the parts of the textbook we need for the first semester, because there was too much to prepare.

- If you redesign it then you can actually figure out how to use the proper tools that will allow the students to have the same experience. The way my course is being delivered to the students is very similar to the way they would get in a face-to-face setting but developed so they can get the same outcome from using a tablet. They are still going out and getting that experiential piece, they are going out and investigating something, they are ... using their computer to write a report, they are submitting it... And it is that assignment that triggered in my other students, we need to do something about this, we need to educate each other. So that opportunity is still there- it's just removed and it's because I have created the course, and I am sure everyone else in the pilot has as well, created the course specifically for the iPad.

- If I was doing this from scratch, we would not have time for this interview today because I'd be busy doing something, but because I have worked for 10 years building stuff, I have a lot in the can already.

- I'm not 100 per cent prepared but I've always had a hard time being 100 per cent prepared for any class. I'm more of a – my weekends are busy preparing for the next week.

- It is up to the individual professor how they choose to blend it, certainly materials are posted online, but they can also, in lieu of face-to-face class time, these students can be given an assignment, for up to 50 per cent of the class time, to my knowledge no one uses that 50 per cent; they could have a lecture lab style course.

- Part of the problem with the online. The course I am delivering for the iPad project is the same course I am delivering fully online, obviously tweaked, one is developed specifically for the iPad, the other one is open for PC use. In creating the course the problem is - because it is the same course they just pushed it online I am not allowed to change to the course outline but I can change the learning plan - but the outline locks me to the assignments of the original class which was a face-to-face which includes essays, journal entries, and all this kind of writing material. So when I asked them what am I supposed to do, when you go fully online you should have a course that is created for fully online, this course was created for face-to-face and I was just going to push it online - this makes no sense - they said just reduce the difficulty, reduce everything down so they can do it themselves but without your help in the classroom. So basically the course has been drastically watered down. Compared to what they would get face-to-face, it's less of an experience because they didn't allow me to recreate the course. So, a really tricky part of using this technology. The course has to be created for the technology or it doesn't work. Anyone who has done considerable research in this area or has worked in the area, would agree with that, that the course has to be totally torn down and reconstructed for a tablet delivery or a fully online delivery.

- If the technology will take away from the learning, I am going to have to monitor that as this is a writing course; if this isn't helping, if it is confusing students if they – if the activities I plan do not go well, I will have to take it class to class...see what works and what does not and hopefully I get a chance to do this again in another semester – as with any class you run through it and see what works and what does not and then you modify it.

- Primarily as a research tool, and they will have access to class notes, and PowerPoints, and videos. As for in class, I am going to try some quizzes, some e-clickers. From what I understand last week, there were some problems with that at the college. I will be careful how I put that in my learning plan - learning plan subject to change.

- I am going back - how will we use this in class. And, for the most part, the e-text, and this software called e-clicker, this is an e-clicker, this is the clicker - we can put things, we can put up a couple questions, stop at one point do a five question quiz. And then find out how we are doing. So, in other words, continuous assessment of how we are doing. And because of the anonymity, we will actually get feedback for a change. Which is also impossible. At first I thought, this is going to increase interaction in a classroom? I was very skeptical. This seemed ludicrous to me. We're doing interaction in classroom and now you want to interact through this? Explain this to me. The analogy came out, does everyone interact in the classroom, does everyone participate in the classroom? No. You always get some who are always interacting and people you never hear from. So, maybe this is a tool where they become, or at least feel they are more engaged or more involved in what is going on and they have their vote and they've had their say - and they say I don't have the faintest idea of what you are talking about. And ok, well, hey, you are never going to get 100 per cent, which means some people are always going to say I don't have the faintest idea of what you are talking about. I'm not sure where the line is. If 60 per cent say they get it, do you just say for those of you who don't get it, maybe go over your notes and then contact me. Where do you say we are stuck or we move forward? I don't know. That's going to be another - what do we do now. (laughs) So, now I've accepted and really understood where that might work in the classroom.

- So what I will do in that 1 ½ hour when they do see me I will apply it. So in each of these modules there are applications - where can that be applied to real life - so it means for me, I have to make another set of- I have to do something else on that day - I will have to prep again. I will have a double - here is my presentation I have done, and I have probably done a number of years ago, cause I have taught, but I have always improved them. I will have to come up with a work, more hands-on, so when you are with me, you are not listening to me yap, yap, yap, we are actually applying it . Now, we might spend a few minutes here and there, highlight highlight, highlight, answer questions. Then what I will do, I will have an application and at the end of the class I will have a quiz. Right now I have to do a paper quiz. Because second year guys don't have any technology. Some do, some don't. First year guys I am going to do the exact same thing, except the quiz will be on D2L.

- But, I know where I want to interject a tutorial - for me an electrical panel. I will put a camera over my shoulder and I will sit down at a desk and wire a panel, with a voice over, you won't see me, you'll see my hands and I know from the guys who have done it, that the students love it. They can watch that again, and again, and again. I don't understand that - ok, I can watch it again. So we are going to improve it all the time, but you still have to engage the student.

- Because I know there's a lot of faculty who have no idea. Some of them don't even use Power Point yet and now they are expected to go to a reduction by going online. There is a huge learning curve. They are still chalk and talk.

- It depends on how you build the course. I don't like giving homework a lot, so basically what I've done is I've reduced the face-to-face time, which is hard, for me by 50 per cent and taking the assignments and giving them time to do their assignments. Rather than coming to class and me lecturing and them going home… they are expected to do their assignments during that allotted time; so every second week they have no class with me and they are just doing their assignments, or I might assign a reading they are expected to do and post a response to the discussion board about the reading. But I am always available during that class time for them to email me or catch me on the discussion board; I also use Skype and other things so they can contact me easily. So that is how I am managing the 50 per cent.

- I will find out. There's a lot of question marks. Hopefully, everyone will be patient, especially in the beginning. Cause, this can cause a lot of stress. To everyone. I know one of our teachers has been pretty stressed. I think he will continue to be stressed; it is kind of his nature, he will be the first to admit it. This type of thing is way out of his comfort zone. We just have to make sure we don't allow that to project into the classroom and then.

- So that is my biggest fear. It's not the fact that students can't benefit from that kind of setting, it's whether the professor or instructor or teacher is allotted the proper time to reconstruct the course, and understands how to reconstruct the course to benefit the student the most while using the technology.

Re: blended learning

- In that first year, the full course I am teaching, I have week one, week two and week three. Content is there. How I am going to deal with the other half of it - I have to feel it, I have to be in that class and I have to face them and - I know what I am doing. I have quiz questions inside the PowerPoint, so they are able to - then I go back and make quizzes out of there- and then - how can I apply this - I am ready. I have all my content, for every week through the entire semester. I just have to convert it to - if all failed and crashed, I would go back to sage on the stage. I don't want to - I am not going to.

- I really thought about that and I think it depends on how the numbers work out. The intermediate class is a three hour delivery, and the beginner class is a four hour delivery. On the students' timetables, they are already seeing different times, two, 1 ½ hour for some, two, 2-hour for others. Some students have joked, does that mean I am in the dumb class. I don't want anyone to feel that way. I wasn't sure how I would do that. I may deliver it as 1 ½ hour and if students need extra time on their writing, then I will remain for the last half hour for those who want or need extra. I will help with grammar or punctuation at that point. Hard to say you have to stay another half hour when you have a 1 ½ hour block on your time table. Hard to say you can leave and you really should stay. I didn't want to do that.

- But I don't think its a process we should - I think there's too many things that we - I think the expectations will be too much for them. I think it is going to take a while just to become - and I am talking again about mature students who are going to find this maybe a little bit of a challenge at first, so we want to make sure we get everyone. The core of this is to ensure they get the education they signed up for. And not to sort of say well, now you have to learn how to do this and now you have to learn. - and they are all adjunct to the content, So, I think for the first semester we've kind of agreed there won't be any reduction in face-to-face because we are going to spend a fair amount of time in class utilizing, hopefully utilizing and finding ways to make this useful in the classroom.

- I want to reduce the lecture, in other words, the presentation of the content. I want the content to be there, so we can highlight the content, so they will get me all weeks, every week. First year. Next semester ... that's when I will start looking at reducing, maybe every other week. We will see how it goes. I'm always a little bit concerned about these first year guys.

- Yes, we're under several umbrellas here, the one that started years ago before this, of course was blended learning and e delivery. Probably three years ago I started with some online – we have been using online for many years as a supplement to the classroom. Then, last year I went full blown into blended learning which meant less face-to-face where I had portions of the lessons that they had to do online. In third semester, I have three 2- hour blocks a week of one subject, so I took one 2-hour block out and said this one is no longer in the classroom, this one is being done online so one-third of it in essence is being delivered online.

- I do a second semester class, a little lab, and one of the biggest complaints is we don't have enough lab time. I know but we've got only so many hours we can offer you. I usually for that second semester class, because we are getting into more complex programmable logic controllers, and I usually for second semester if you are looking for me, if I am not in a class, I am sitting in a lab and I'll have students in there. I've had them in here - I think it was 7:30 a few times last semester.

- To me mean blended is some online material that supplements what I am doing in the classroom. Or if a student misses a class then he can *hopefully* make up for the class with the material I have online. I would never suggest that a student not go to class and rely 100 per cent on what I have online. I don't think he'll be successful. I think there has to be some interaction between us.

- You can look at this as a reduction in face-to-face time, you can also look at it as being the opposite and increasing the non face-to-face with the student because they can go home and do things they could not before. Well they could for me because I had a lot of stuff online anyway. Most of my students don't want less hours with me, they want more hours with me; in fact I have some of them in some shops, can we come in here another time - you know- yes, you are welcome- you can come in any time you want.

- And, although I don't think it will ever happen, and this is one of the fears for a lot of faculty, if I get all this stuff online. And I will be out of a job. I hear other faculty say well, if I develop this stuff, it's mine, it's not the colleges. Which I don't understand that. They pay me a pretty good salary and whatever I develop is - had someone ask me yesterday, well, who owns that material. Well, (the college).

- yes, except that a lot of the stuff is black and white, it's technical in nature, it's absolute. It has to follow the laws of physics so, it's not open to discussion. In the sense of something that is more philosophical.

- can you use the flipped classroom in these sorts of new ways of teaching? It depends, I think on the subject matter and how well it lends itself. Right now, I am really not sure what does and what doesn't exactly. I don't know

Re: students

- I think those that think the iPad is cool will like it. I think they will see it as a non-traditional approach, which those who embrace that ideal will like it. It's hard to say when it comes to those that have little or no experience. I know we will have people who have never turned on a computers; that's a fact, we always get people who have never turned on a computer, so I don't, I can tell you it is obviously going to be a bit more of a learning curve.

- I have had a number of students who are not comfortable with computers and the iPad puts that over the edge, and some who had their own iPads, and are probably more advanced with it than I am which is scary too. It will be interesting over the first few weeks to get everyone's comfort level up. A big learning curve for a lot of these students.

- I am hoping they will embrace it, I am hoping they will see the point of it, which is this is everywhere and it is accelerating rapidly, the use of this type of device, and it will only evolve into something more, I am sure, and so education is part of that, to be on the front of where - so when you graduate you won't be lagging, you will actually be at the forefront of how these new technologies are going to be used, and we are going to keep sending that message hopefully. This may seem to some of you as tough medicine, but like all medicine it's for your own good.

- The students will dictate that. If they say, I absolutely have to- All these questions you are asking and more, came up in the beginning, and basically, it was, we have to drag them kicking and screaming into the future. That's all there is to it. And I have to agree with that.

- So while I am talking I will explain why I am doing it this way, what I am doing, you know step by step so, I find if I do something in the lab, I usually have 3-hour classes and what I do in that 3-hour class with– used to be 20, now pushing sometimes 45 students at me, it's a little difficult and sometimes depending on the classroom dynamics, it goes

very well, sometimes it doesn't go so well. I had one class last year and one guy, after I got started, he would get up and he'd say, I will wait on the video and he would leave, because he could not stand some of the questions that were coming and the disruptions. For him it was easier to focus at home and watch a tutorial video than to put up with some of his classmates.

- They love it because they can stop, rewind, watch it again and again. That's what the real strength is.

- Or if a student misses a class then he can *hopefully* make up for the class with the material I have online. I would never suggest that a student not go to class and rely 100 per cent on what I have online. I don't think he'll be successful. I think there has to be some interaction between us. Certainly for some of the hands on stuff you've got to be there. But this is a very portable access device to that material.

- You are not there all the time if you are reduced face-to-face. You have done online courses. It is very impersonal. All it is, is content. That's all it is. Even when you email, you don't see body language, you don't hear voice. All those things. Definitely it will reduce that part of it.

- it is early, but I anticipate there will be some students just won't engage.

- There's always those students who never do anything off line. The in-time classroom is more for them. Like the one student who didn't like the noise in the class, he found it better to hike off and watch a tutorial. But some of those other students, I can tell. I've gone in and looked. I had one student who didn't produce anything, and I went in and looked, and he spent 3 minutes on my tutorial and the first tutorial was half an hour. I mean, I'm not surprised you have problems. You have to do a little bit of work outside the classroom.

- For students who are not 4 or 5,000 level students in a master's program… it's difficult, especially when you are in your first year, fresh out of school, not too sure what you are going to do for the rest of your life, not as committed… it's difficult for them.

- In third semester, I have three 2- hour blocks a week of one subject, so I took one 2-hour block out and said this one is no longer in the classroom, this one is being done online so one-third of it in essence is being delivered online. We won't get into whether that was successful or not. It was for some people and it wasn't for others who didn't have any self-discipline because they didn't actually do it.

- I have a fall online course right now and my class time is slotted for Saturday, so I am meeting students on Saturday who are not going to come and see me face-to-face even if I asked them to. Most of my students now, one week in, haven't even accessed the online material. It's incredibly difficult to wrangle them in. If you have a classroom, it's almost like they feel more obligated to come to class, sit in front of you. Once you see them and they build a relationship, they come to class more often.

- The beauty of our courses is we still get them. The majority of courses, I would say 95 per cent of them, the course is theory and lab. Well, we can't reduce face-to-face in the lab, so we have them here for the theory and we may reduce that face-to-face, but I still get them in the lab. This semester, my first year guys I get them for theory class and I will do some reduction but I will still see them for a bit, but then I also have them for a lab. So I will have that opportunity to do that. One of the downfalls of it will be for the non self-starter and there's a lot of them out there.

- Teaching online is like teaching in the middle of Wonderland… students can go anywhere, they can do anything other than what they are doing… so the minute the feel bored. They just switch off and they are on Facebook or Myspace, or whatever…and in the classroom, sure they do the same thing, that argument is there, I have heard it a million times, but, when we are face-to-face, I can tell when a student is not listening to you and they are on Facebook, or they are watching Netflix, when they have their head phones on, in the classroom. I can turn that off in the classroom, I can disable that but I can't in an online environment.

- Exactly, yes, we spent most of the time in discussion, not so much, here are the steps.

Appendix L

Post-Pilot Teacher Interviews

Re: technology

- (regarding the clicker) iPad was great for instantaneous quizzes. You could turn on a quiz and have the class do it. I used it more so the first semester than the second. Lot of times, I would have a lecture and then an anonymous quiz. Give me the answer to this, the survey says - that we should talk about this a little bit more or survey says we should move on. That was a great tool.

- Whether it (iPad) was the best tool or not? Personally, I would rather see them all with a fully functional laptop. Although the classrooms are not set up that they can all plug in. I know the battery life on most laptops is terrible – that was one of the good things with the iPads, if they were charged up, they would last all day and another day and a half sometimes. But, they lack a little bit in functionality. A fully functional laptop (with excel – it's a little stronger in some areas, or maybe I just don't know Numbers that well). With CAD software, works great on, don't know about a MAC. They have a MAC version but I think the fully functional laptop would be a better choice. As far as the tablet goes, we had some issues with flash videos and the learning platform didn't handle the mail too well. But, the new version of D2L should work better.

- It gave them constant online access to LMS all the time. I got a lot of messages from students who were in class, or between classes, but it was through the learning platform. It's a good sign that they had accessibility to it all day long, which is good. They would email and ask me if I was going to be here or there. In a lab, I could respond back. 24-hour access. Portability is good.

- Now, it's as if the monitors are giant tablets themselves. I suppose that limits you to the podium area but with clickers and other things, I like to have my hands free. I didn't enjoy, like carrying around the iPad. I think that if you are speaking, doing things on your iPad, you are not necessarily addressing the class as you should be, you are talking into your iPad.

- I did my final exam with 47 students sitting shoulder to shoulder and everyone had a different test. Because I had spent the time to build my question bank quite large. They had 110 questions. It's a fully randomized test. Give me a 110, some from here and here and here. It worked great.

- The system, I didn't realize with some of the assignments I was asking the students to do, they could not do it easily on an iPad, with discussion postings and submitting papers to a drop box and email it was difficult. You would see a lot of the html text and other things in there, there were issues with flash and I just found out this week there is a web browser

which would alleviate some of that, it was still a bit clunky. And we are changing our LMS and finding out more about this so these may be a non-issue in the future.

- Specifically, the quizzing was great specific to the iPad. The initial engagement was great; it was very exciting for students, and I think it is great they have a tool, and no matter what, they have learned something, and it is a life skill now and that could give them an edge over other potential employees who are not tablet literate.

- The only negative I would say was giving them permission to watch their movies or play their games. They would set up their iPads and some of them would engage and others, they wouldn't even hide it. That was frustrating. In past semesters, when students first started bringing laptops to class, sometimes you would ask them to put them down while the lecture was going on. Of course now everyone has some sort of device, which is great, but they have to, ultimately, they are responsible for how they will use it. Sometimes I wonder if it is more of a distraction - ok bring your iPads and set them up and follow along - so you really have to be careful how you are using it, or make sure you are using it, everyone has to work on this assignment and you walk around but you don't really want to be monitoring the whole class.

- I think it was great. I do think a small laptop would be as effective. Certainly it is still difficult to write larger pieces of text on an iPad and there is really not a great way to save your information. So that is unfortunate. But, it is still a great tool for the students that would use it.

- Couple of students did in presentations, have used keynotes or a couple used pages. Because they have Apple products. Has created a little bit of a problem for us as faculty – how do I open an Apple product on Microsoft. I went into my iPad and opened it and emailed it to myself as a pdf. It works. That's the target though. The other thing is, it's great. I can go into D2L and I can test.

Re: blended learning

Reduced face-to-face time

- Yes, I won back some time to do some hands on with some of the equipment in the lab, because they, of course don't have that equipment at home. And I said, following the lecture and answering some questions and a quiz, you can do that online, or at home or any other place you would like. And I suggested our time would be better spent if we went back to the lab and practiced for some of the hands on tests that they do.

- Yes. There's the answer. We were able to reduce face-to-face time because the content was delivered. I had everything pre-posted. Students were able to look at it, students were able to come to class with some head's up knowledge, students were able to come to class having participated in practice quizzes.

- Well, direct, I don't think we were ever really trying to necessarily reduce face to face, that's the ultimate goal of the project, but we were still scheduled for a two hour class, I would still have a two hours class. Now, I had a lot of students who didn't come to the two hour class and there was enough material online that they didn't necessarily have to be there for the class. The whole concept of reduction in face-to-face time I struggle with because I know it is freeing up classroom hours, so they can fill it with somebody else. I know room is an issue and we have a couple programs moving from one campus to another, so classrooms are at an all time shortage, I think. Now, I don't like to think that is the entire reason for the whole concept of blended learning but I know most of my students would prefer to have more time in the labs, more time with the instructors, they really are not self motivated from the start.

- What we did was, here's the information and here's some quizzes attached to it. Go figure it out. When you come to class now I am going to go over it, and I wasn't very good at summarizing, I tended to be too detailed. I need to be better at summarizing, It's the old sage on the stage, it comes back – that's what comes back.

- I am hearing that two hours face-to-face you will have to reduce it still by 30 per cent, whatever that math comes out to, 45 minutes or whatever. I don't know how you do that. I attempted that with a design project in my 4th semester group, which was not the iPad group. I reduced it because I have two hours of lecture and it is basically a set up for an assignment and all those assignments end in as a project in the end, that they present, they get up physically and they present. It didn't work well. It did not work well. I presented, I had everything online, they had it available, I showed them where it was, showed them how to use it. My class time was, here is what I am after, here is how to use it, rock and roll. See you later. Away you go. I could cut classes to about one and a half hour, I was cutting my time there by about 40 to 50 per cent and it didn't work well.

- (did it change how you approached classes) Yes, with the number of resources available on the iPad at your fingertips, I think that was really great for some students whether or not they used it, I certainly included more online resources so if students were having trouble in the middle of a class, with a certain element, they could look that up right there. I posted different quick links, for those types of things. They could do practice quizzes. I did change a few things. I made a few assignments around the iPad. Other than that I don't think the material changed. If students could use it and used it for the purpose of research and learning, it's a great tool. But I don't think a lot of them took that initiative.

- Also, there was a large portion of the class that didn't even look at it (online content). So, we have to educate our students or re educate our students that this is the way it is going to be. In fact, we are being driven to blended learning for September 2013 that 100 per cent of our theory courses will be reduced in hours by 30 percent, in other words, reduced face to face, and we will be scheduled reduced face to face time. So, that's the target, that's where we are going whether we like it or not. So, we have to re educate our students.

- (did you post information in advance of class) Like the flipped classroom, that was not necessarily part of my strategy because I wanted them there, I needed to see their abilities and I wanted to see that it is their work that they are producing. Perhaps on the exit course, if I have them for that course, I would do little bit more of that but I wasn't my strategy this time.

- It is a goal of my department to have a strategic reduction in face-to-face time. So we have been doing that, but because of the remedial element, I limited that a little bit. I did have a few, what we call blended dates, where the students had assignments and they would do it remotely, but I was still available in class for those remedial students that needed extra help. So yes, we did reduce it, but as a direct result of the iPad, I can't say it was because of that.

- I think blended is the probably best of both worlds because if they don't see you for one week say, they are probably going to see you the next week, they can email you, and I generally get back to my students the same day or they can hold their questions until they see you next time.

- It has the potential to reach more students. One very big advantage is it has forced faculty to post ideally all of their content online and initially I always thought that students would not come to class they would just go online and read everything, but what has happened sometimes is the opposite. They come to class or they prefer to come to class and a lot of them don't even look online. Which surprises me. I used to think they will look online. I would say only maybe 5 per cent of students that will go and read every module rather than come to class and do well that way. And that is fine. It is advantageous for those people, generally those who have families and other jobs. It's fantastic, if they can keep on top of the work, I think that is great. If they are sick, if you miss a class, you can look it up, you are not missing out like you would in the past, which is great.

Faculty perspective

- Well, I don't think it is as beneficial as students think it is. I've had so many students say oh, you get all this time off. I find it is just as much work for me, perhaps because I still do go to the classroom on the dates that students don't have to be there, just to be there for those students who need extra help. You still have to plan classes.

- I spend a whole lot more time preparing. Sometimes I will do a lecture in class and then go home and put it online based on what I covered in the lab. Every year I do something a little different. I'll pick new projects and hopefully I am improving every year and making it better. I redo a lot of these tutorial videos – even if I have the same project I see a different way every year.

- The marking, I don't think it's a great difference in my discipline just because it is a lot of writing. I see, of course, that MIT and Harvard are having these essay marking

computers but I don't think we are there yet. So I don't see that much of a difference work wise – it is still the same work load

- I suppose once you get things going if you have modules set for your blended class dates, or the dates you are not in class, if you have those preset, I suppose you could just tweak those, eventually it would be less work in prep time.

- In fact, it's probably more of a learning curve that you have little bit more computer time than you would in a face-to-face work. In a face-to-face class you lecture for your 2 hours, and then you are done, students can ask you things in class, but if you don't have that luxury, they will email you constantly. I would have, depending on the semester, anywhere from 20 to a really bad semester, 80 emails a day, which is a lot, and that fluctuates certainly.

Students

- When you leave it to them, whether it is the type of student we have because our students are more tactile than academic. We're not really sure but that's what I feel – they are more tactile - show me, let me feel it, then I will learn it, but expect me to read something and then do it, likely I won't learn it. It's been good, I think it is a fabulous tool. We have been able to test with it.

- I really like the concept of flipping the classroom but I don't think my students are the ones that really respond well to a flipped classroom. And as much information as you want to put online, there are some students that are not self motivated to make sure they get everything done. Now, I had one guy that emailed me everything two days after the deadline, and even that deadline, in the last week, I kept moving it every day because I knew I was going to have lots of people not submitting anything. Friday I was here until 6:30 with students, "come on guys I got to go home, you know." Now there was a lot who didn't submit anything. Now, they were working with me throughout the semester but if you don't make the deadline. And I was maybe a little firmer this year than I normally am.

- (what is your experience with blended in other program areas) Well, it is similar in that those students that are self directed enough, do very well. I do ask students in a discussion posting at the end of a lot of my classes, what do you think of this blended. Do you like the idea of having less face-to-face time and maybe more time to work on things on your own. And, I get mixed reviews. Some students know they need to be in a face to face classroom, in order to perform, in order to have those reminders, in order to be accountable for all that work. Other students say wow, this is fantastic, I can do this on my own time.

- A big project at end of semester, and this was the worse year I have had yet for people who did absolutely nothing. I had not a huge class but there were far more people that handed in absolutely nothing at the end of the semester.

- I find that second career students, students with families, students with jobs, other responsibilities, tend to manage their time a lot better, becomes a real time management issue as well, but I think the blended courses, the reduction in face to face time, is terrific for motivated students. But for some of those students who may new to college, may not be able to take advantage of that; it may not be the best thing for them.

- Yes, everyone had the option (of working off site) and there were a few discussions and a couple research assignments you could do remotely and submit the work. It went fairly well. Some of the students that didn't do it really don't really have an excuse because they had their iPad. I would have loved to see them over the course of a couple semesters to see if they would engage a little more.

- Out AutoCAD guy, when he was with the iPad people, put video after video after video online, camtasia captures of his screen, and he said, here's the assignment, this is what we are doing in class, it's a two hour class. If you can't make it, ok, watch the video and see what we did. The teacher has done some excellent videos - there's 30-40 videos online that show you how to do this. Over half the students never watched the videos.

- The students wouldn't engage. The guys that did engage, loved it. Even if they missed a class, they would ask, what did I miss, I would show them on D2L. Go look at it. Walk through it and if you have any questions come and see me. And they did. That was for probably 20 per cent of the class. A very low margin. The other 80 per cent of the class, it was just brutal. Now, whether it was this group, who knows, it's possible, or whether it was the reduced face to face. I haven't had enough time to really understand that. We have to do it, so, let's do it but what can we do better. Maybe I need more examples online, those kinds of things.

- And, they are not engaging in that respect - iPad or no iPad, they are not engaging. We have access here at school. They have access at home they have their iPad. We set it up so they could watch it on iPad. We had some Apple issues with the flash drive. We have sorted it all out with out IP people. Stuff is available. What I am seeing, I really believe we have to educate our students coming in. By the way, it is no longer sage on stage. It's self-directed. Now, we are available 100 per cent of the time.

- (were they motivated because of the technology) Difficult, because I only saw them for one semester. I would like to think, yes. Initially, when I was told about the project, I thought great, this will be an equalizer because I find many of the new elearning platforms marginalize some students if you don't have a computer or don't have that knowledge or those skills, or that accessibility. I know there are computers at the college they can use, but not everyone has the same understanding level, and accessibility is still an issue, so I thought that would even that out and everyone will have their tablets here and I didn't actually see that, I saw that the students who are academically stronger, they

tended to go farther with the tablet; I think, they took advantage of the things you could use it for, the research, they found other apps that were useful and they really engaged. Some of the weaker students, maybe they used it for… gaming. (laughs) That's tough. But, as I said, if I had seen their progress over this semester, or three semesters, I could answer that a little bit better.

- If it is a three hour lecture, and I am cut to two hours, I am still available for that hour. A lot of staff and faculty think, oh you are cutting my hours so now you can give me more work, but no, you are still scheduled for that three hours.

- (did allowing student to work off site and access you if they were struggling allow you to spend more time with students who need it) I think absolutely students could use that to their advantage, and you certainly have all those resources at your fingertips, but you also - the reduction in face to face time, means students need to be that much more self-directed and many of them just aren't, they don't have that self-directedness yet; whether that is an age thing, or experience thing, or they are just not used to that, I think for many students they won't use these tools to their full advantage, unfortunately.

- There is the idea of the flipped classroom; ideally it is great if students do their reading and their work and research ahead of time, and you have time to reflect and discuss and scaffold on what they have already learned; however, that is contingent that they actually do this work before they come to class and from my personal experience not many students do, but it is limited and it's still fairly new and new to a lot of students. So, I can't say for sure. It's great for those who do the work, but for those who don't, I don't see the benefits.

- Certainly, they learn, and that is reflected in their test scores, and their papers, and they have more time - they can allocate their time as they see fit and they can save in other areas, focus on other courses that they need to do that during this course time; again, it's a time management. It's great if you are reflecting or discussing on something that students should have done previous to the class, it's pretty obvious when a lot of students have not done the work and only a handful have done it and those are the only ones who are able to participate in class.

- If I do see these particular students in their 3rd or 4th semester, then maybe that will change because they are more familiar with the technology and they know what is expected of them and they are used to the blended learning. It may have been completely new when I had them in first semester. Maybe those who needed the extra help won't need as much help or may be a little more self directed by that time.

- (student response to more lab time and lecture online) Oh, I didn't have any complaints at all. Now, only about half of them made use of that time in the lab. But, the lab is pretty small. We usually break it into three groups. I have about 60 students and the lab is only set up for 20 but, but still those students who felt they needed the extra lab time. I basically camp out in this lab for second semester because they can't practice at home

and in the lab I have it fully equipped with all the software we use for our program. So they are not in there just doing my projects, whatever else they want to work on as well.

- (why the students like the videos) Because it is so visual. They can see things and I try to explain why I am doing certain things a certain way. They can watch me do it in classroom, on the big screen at front, but they don't have the opportunity to rewind and stop me like they do with the iPad. I have had a few students who have said, it's really good because I can back up if I miss something and start again. I've had a number of students in the past who are hesitant to put up their hands, they don't want to stop the flow. I always pace myself and you can judge from their reaction to how I am proceeding, as soon as I hear total silence - "I've lost you all haven't I"- and sometimes you get those nods? A few years ago I had one student and he was a character, I was at the board and heard some chuckling, I turned and he had a crossing guard stop sign in his hand. I'd always said, stop me and we will back up. What happened to the crossing guard – he never did say. But we had a good laugh.

Top achievers

- Self- motivated students that managed their time well and didn't waste anytime. I don't think I would attribute it to the iPad. Although, they both certainly made use of the iPad. They would have been at home watching those tutorial videos and using some of the tools, but it may have been enhanced some of their calculating as I am sure they were both using the Numbers software. They were both using the tools as much as they could, whether they could do that with the iPad or something else, hard to say.

- Well, because they knew enough to hand things in by the deadline. For the mechanical drawings, I am trying to get them to prepare a stack of mechanical drawings they can slip across an interview table. I allow them to revise their drawing and resubmit and I will mark it up and if it's not good, they can resubmit again and again and again. These guys came in for some extra hours, had me review their drawings, they got 100 per cent. I had a lots in the 90s, high 90s and 80s. And then I have this bunch of students with 0s. 0s. I mean they handed in absolutely nothing. Now, the way I structured the course, may not have been the best. Because it's such a big project; now there was another project before which they should have finished as well, long before reading week. I think next year I will have a weekly submission just to make sure they are doing something. And we can build in some marks from them.

Appendix M

Student Survey

Mohawk College Students: Research ipad project SurveyMonkey

1. Did you enter the mechanical engineering program at Mohawk College directly after completing high school? (You completed high school in June 2012)

	Response Percent	Response Count
YES	20.0%	3
NO	80.0%	12
answered question		15
skipped question		0

2. What year did you graduate from high school?

	Response Count
	0
answered question	0
skipped question	15

3. Since graduating high school I have (check all that apply):

	Response Percent	Response Count
Worked full-time and did not attend school	58.3%	7
Worked part-time jobs and did not attend school	16.7%	2
Attended another college program or programs at Mohawk or elsewhere	**66.7%**	**8**
Attended university	8.3%	1
Looked for work but was unable to find a job	8.3%	1
Other (please specify)		1
answered question		**12**
skipped question		**3**

4. If you attended other college programs, did those programs use ipads or any kind of tablet as part of the instruction?

	Response Percent	Response Count
YES	0.0%	0
NO	**100.0%**	**12**
answered question		**12**
skipped question		**3**

5. Before I came to Mohawk College, I owned a tablet computer. (ie: ipad, Playbook, or any other kind of model)

	Response Percent	Response Count
YES	6.7%	1
NO	93.3%	14
answered question		15
skipped question		0

6. Have you taken courses where technology was used, at least for part of the course, to replace an instructor's lecturing at the front of the classroom?

	Response Percent	Response Count
YES	46.7%	7
NO	53.3%	8
answered question		15
skipped question		0

7. Please describe your experience.

	Response Count
	3
answered question	3
skipped question	12

8. During this year at Mohawk, when course resources (such as Powerpoints, lessons, video, readings etc) were available online, it was possible for you to learn the material without direct instruction from the teacher.

	Response Percent	Response Count
YES	26.7%	4
SOMETIMES	**73.3%**	**11**
NO	0.0%	0
	Comment	2
	answered question	**15**
	skipped question	**0**

9. During this year at Mohawk, class lectures were reduced as a result of the resources that were available online.

	Response Percent	Response Count
STRONGLY DISAGREE	6.7%	1
DISAGREE	13.3%	2
NOT SURE	13.3%	2
AGREE	**66.7%**	**10**
STRONGLY AGREE	0.0%	0
	answered question	**15**
	skipped question	**0**

10. During this year at Mohawk, you used the ipad to access online resources across all of your courses on average this many times:

	Response Percent	Response Count
DAILY	86.7%	13
REGULARLY (1-3 times a week)	13.3%	2
RARELY (1 - 2 times a month)	0.0%	0
NEVER	0.0%	0
answered question		15
skipped question		0

11. How did you access the online resources?

	Response Count
	0
answered question	0
skipped question	15

12. The intention of the i-pad pilot at Mohawk was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom. Which aspects of this pilot worked well and why?

	Response Count
	14
answered question	14
skipped question	1

13. The intention of the i-pad pilot at Mohawk was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom. Which aspects of this pilot need to be improved and what suggestions would you make to improve them?

	Response Count
	14
answered question	14
skipped question	1

14. Consider the description of the pilot project in the previous question and then think about the last time you were in school before coming to this program. Compared to your last school experience, do you think that in this past year at Mohawk, you learned, in a comparable amount of time (choose one)

	Response Percent	Response Count
MUCH MORE MATERIAL	**35.7%**	**5**
SOMEWHAT MORE MATERIAL	28.6%	4
THE SAME AMOUNT OF MATERIAL	28.6%	4
SOMEWHAT LESS MATERIAL	7.1%	1
MUCH LESS MATERIAL	0.0%	0
answered question		14
skipped question		1

15. Rate the effectiveness of the following methods of learning

	Very effective	Effective	Neutral	Ineffective	Very ineffective	N/A	Rating Average	Ratin Cour
IPAD	15.4% (2)	**53.8% (7)**	15.4% (2)	15.4% (2)	0.0% (0)	0.0% (0)	2.31	
D2L LEARNING MANAGEMENT SYSTEM	28.6% (4)	**50.0% (7)**	14.3% (2)	7.1% (1)	0.0% (0)	0.0% (0)	2.00	
E-TEXTBOOK	21.4% (3)	**50.0% (7)**	21.4% (3)	0.0% (0)	0.0% (0)	7.1% (1)	2.00	
ONLINE LESSONS AND READING MATERIAL	21.4% (3)	**71.4% (10)**	0.0% (0)	7.1% (1)	0.0% (0)	0.0% (0)	1.93	
TEACHER LECTURES IN THE CLASSROOM	**57.1% (8)**	35.7% (5)	7.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	1.50	
HARD COVER TEXTBOOK	14.3% (2)	28.6% (4)	**35.7% (5)**	7.1% (1)	14.3% (2)	0.0% (0)	2.79	
QUIZZES IN THE CLASSROOM	35.7% (5)	**57.1% (8)**	7.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	1.71	
IN-CLASS EXERCISES OR PROBLEMS	35.7% (5)	**57.1% (8)**	7.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)	1.71	
						answered question		
						skipped question		

16. In those courses where your teacher did provide course material online, how much time did you spend each week BEFORE class preparing to attend class accessing new course material provided by your teacher online? This would be per course, per week, on average

	Response Percent	Response Count
Less than 15 minutes before class per course	**35.7%**	**5**
Half an hour before class per course	**35.7%**	**5**
45 minutes before class per course	7.1%	1
One hour before class per course	14.3%	2
An hour and a half before class per course	7.1%	1
Two hours before class per course	0.0%	0
More than 2 hours before class per course	0.0%	0
	Other (please specify)	0
	answered question	**14**
	skipped question	**1**

17. In those courses where your teacher did provide course material online, how much time did you spend each week AFTER class reviewing the lesson taught in class – either reviewing online material or working on assignments or lesson material provided in class. This would be per course, per week, on average.

	Response Percent	Response Count
Less than 15 minutes after class per course	14.3%	2
Half an hour after class per course	14.3%	2
45 minutes after class per course	14.3%	2
One hour after class per course	7.1%	1
An hour and a half after class per course	7.1%	1
Two hours after class per course	14.3%	2
More than 2 hours after class per course	**28.6%**	**4**
	Other (please specify)	2
	answered question	**14**
	skipped question	**1**

18. I came to class prepared for quizzes and practice exercises

	Response Percent	Response Count
NEVER	0.0%	0
SOMETIMES	0.0%	0
USUALLY	**50.0%**	**7**
ALWAYS	**50.0%**	**7**
Other (please specify)		0
answered question		**14**
skipped question		**1**

19. Since September, I have met face-to-face in a one-on-one meeting with my teacher outside of class time

	Response Percent	Response Count
NEVER	7.1%	1
ONCE	14.3%	2
TWICE	7.1%	1
THREE TIMES	7.1%	1
MONTHLY	**28.6%**	**4**
WEEKLY	**28.6%**	**4**
MORE THAN ONCE A WEEK	7.1%	1
answered question		**14**
skipped question		**1**

20. If given the choice, I would prefer to

	Response Percent	Response Count
LISTEN TO MY TEACHER LECTURE IN THE CLASSROOM	**64.3%**	**9**
LISTEN TO AN AUDIO RECORDING OF MY TEACHER'S LECTURE WHILE I VIEW POWERPOINT SLIDES POSTED ON LINE	7.1%	1
LISTEN TO AND WATCH A VIDEO OF MY TEACHER GIVING A LECTURE ONLINE	28.6%	4
Other (please specify)		0
answered question		**14**
skipped question		**1**

21. If given a choice, I would prefer to read

	Response Percent	Response Count
E-TEXTBOOK ON SCREEN	**57.1%**	**8**
HARD TEXTBOOK IN PRINT	42.9%	6
Other (please specify)		0
answered question		**14**
skipped question		**1**

22. Thank you for taking the time to respond to this survey. Are you interested in the focus group? Would you like to say more about the ipad pilot and how it impacted your learning? If you would like to participate in a focus group as part of this research study, please send an email, separate from this survey, to the researcher: Kim Denstedt, at kdenstedt@conestogac.on.ca Inidicate you are a Mohawk student and would like an invitation to the focus group. Include your name and the email address you would like me to use for the invitation. That invitation will include where and when the focus group sessions will be held. You are free to accept or decline the invitation at that time. The session will include lunch and a gift for your participation. I will accept the first 12 applicants who email me, Kim

	Response Count
	0
answered question	0
skipped question	15

Page 2, Q3. Since graduating high school I have (check all that apply):		
1	Business General	Mar 19, 2013 11:11 AM

Page 3, Q7. Please describe your experience.		
1	It was easier than going to class	Mar 19, 2013 9:35 AM
2	Mainly positive but certian issues with elearn are a pain	Mar 12, 2013 9:35 PM
3	I hated it.	Mar 10, 2013 9:38 PM

Page 3, Q8. During this year at Mohawk, when course resources (such as Powerpoints, lessons, video, readings etc) were available online, it was possible for you to learn the material without direct instruction from the teacher.		
1	With many slideshows elearn postings many messages seemed rushed and unclear would much rather have in class lectures	Mar 18, 2013 5:28 PM
2	you can always learn more from a prof than a screen	Mar 12, 2013 9:35 PM

Page 4, Q12. The intention of the i-pad pilot at Mohawk was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom.

Which aspects of this pilot worked well and why?

1	yes, it has reduced the stress to pick up notes or books for individual course.	Mar 23, 2013 10:42 AM
2	easy, convenient	Mar 23, 2013 9:19 AM
3	yes, it is great. we can acces our courses anywhere and anytime	Mar 19, 2013 11:25 AM
4	It was easier just to open up the ipad instead of going to class	Mar 19, 2013 9:39 AM
5	doing tests online worked well because i did not have to drive to school and write the test in class.	Mar 19, 2013 7:17 AM
6	Having access to the material ahead of time helped to streamline our in class time. Instead of just being taught the material we could ask for clarification on points we were unsure about	Mar 19, 2013 5:08 AM
7	The ability to follow along in class lectures and simply highlight information instead of having to write out overhead lectures	Mar 18, 2013 5:36 PM
8	The learning aspect.	Mar 13, 2013 10:39 AM
9	The quizs work well because everyone has the same tech, I also like using it in the labs for schematics and data collection	Mar 12, 2013 9:39 PM
10	The content section where all assignments and informations were posted. This worked really well, it allowed me to review exact information whenever, wherever.	Mar 11, 2013 1:57 PM
11	I dunno	Mar 10, 2013 9:42 PM
12	Didn't really cut down lecture time but i-pad made it possible to write our own notes on top of power pt slides while recording lecture, for further review, thru Notability app.	Mar 8, 2013 7:05 PM
13	Maybe the the shorter lecture time	Mar 8, 2013 9:32 AM
14	Not having a large book load & having instant access to notes.	Mar 7, 2013 4:50 PM

Page 4, Q13. The intention of the i-pad pilot at Mohawk was for teachers in the mechanical engineering program to place course resources online for students to access outside of class and then to reduce lecture time in the classroom.

Which aspects of this pilot need to be improved and what suggestions wo...

1	easy access to everything wherever and whenever we needed.	Mar 23, 2013 10:42 AM
2	elearn software on iPad	Mar 23, 2013 9:19 AM
3	cfsfss	Mar 19, 2013 11:25 AM
4	more material learned in a shorter amount of time	Mar 19, 2013 9:39 AM
5	some of the notes that are put online dont show up or dont load up	Mar 19, 2013 7:17 AM
6	There were a few bugs in the system. Mostly email related which I'm sure will be ironed out	Mar 19, 2013 5:08 AM
7	Elearn's iPad accessibility with HTML and not being to email directly from iPad so it is necessary to own or have a household or laptop computer to access. Also the information gets jumbled together where as with books it is very organized and in order	Mar 18, 2013 5:36 PM
8	the aspect for elearn to be more accesible on the ipad.	Mar 13, 2013 10:39 AM
9	Compatibility issue's and btw this Manufacturing not mechanical	Mar 12, 2013 9:39 PM
10	Emailing sometimes is difficult as well as flash player not available on this device	Mar 11, 2013 1:57 PM
11	I dunno	Mar 10, 2013 9:42 PM
12	have etexts available for reference purposes, apart from required texts	Mar 8, 2013 7:05 PM
13	Not everything was accesable on the ipad. If there was a way to do so, it would make things much easier.	Mar 8, 2013 9:32 AM
14	resolving issues w/ e-learn compatibility w/ Ipad.	Mar 7, 2013 4:50 PM

Page 4, Q17. In those courses where your teacher did provide course material online, how much time did you spend each week AFTER class reviewing the lesson taught in class – either reviewing online material or working on assignments or lesson material provided in class. This would be per course, per week, on ...

1	only at home	Mar 23, 2013 10:42 AM
2	at home	Mar 19, 2013 11:25 AM

Appendix N

Focus Group Quotes

Re: orientation and piloting a new approach

- Yes, we have been the guinea pigs, I get that. There are going to be issues. Without them it would have been a little bit better. But they did a really good job. I don't have any complaints about having to learn iPad. They brought in people from Apple, the first whole week of our course was nothing but training on how to use this thing. By the end of it I could close my eyes and use the thing. They have done an awesome job. All the information I need is there. All the videos. Sometimes, you get a funky video, but, it's going to happen, but they fixed it as soon as we let them know. I'm impressed.

- If they had taken more time to finalize the piloting of the program. As far as all the glitches they have run into thus far, if they had run through a few scenarios. To see, ok, we will have problems with this and let's try to avoid that situation. It's like anything out in commerce, they don't do enough beta testing on a product before they release it to the public. And then the public gets it and then they find out we have all these different problems we have to fix now. If they had done a little bit of beta testing, we'd probably be further ahead and we might have that reduced class time overall. Just my perspective.

- They should have jumped on the individual learning plan if you are going to use this. This has the capacity to give each person an individual learning plan – instead you are just of giving everyone something shiny and we are still learning in groups. So, it really hasn't changed.

- So they are making videos in class while they are teaching it instead of having it all ready to go. Makes it a bit…
- - a bit of a time constraint for the instructor aspect

- Oh, they are still putting the course together

- Yes, it is still a big puzzle they are finishing the pieces with

- I think it was 90 per cent good but 10 per cent frustration. I think, most of the pressure went on our teachers.

Re: LMS

- It was a breeze

- The mobile version it's really handy because that's the front screen you get. You get news, up coming events, what's due today, what's coming up to be due. What's closed.

Availability of drop boxes. This is open. This is closed. This is going to open tomorrow. Like that.

How LMS was used

- All course content.

- Every single piece of our course content.

- Quizzes, PowerPoint's, our Grades, discussions, tutorials, videos. Everything. One of our instructors set it up so that the tutorials that we had to watch were in the quizzes section. So that we had to go through and answer questions, yes we watched the video, submit the quiz, and then it would populate the next one.

Discussion about instant grading with quizzes

- Instant marking on quizzes is nice
- Yea
- A week later you don't get angry. You would just get angry at yourself right there. Like, I knew the answer to that!
- The second you hit submit, it spits out your mark.
- And shows you what you did wrong. Up to teacher to check off those boxes.
- (Someone) got aggravated and stopped doing that and made us wait like a week to get our marks.

iPad

- We did have an electronic version of a book that was available to us but in retrospect they forgot to put in the milling portion of the book for this semester's content. So, we were sort of lacking in that aspect, so we had to run off the instructor's notes, whatever he provides us with, and the critiquing tutorials that he has given us. For the most part, it's no different than just using elearn on the lap top, or a regular computer, from what I have found.

- (A teacher) said he was going to try to have some face time which was one of the apps we were more or less coerced into downloading but we have not had any utilization of it as of yet. I think it was more of a time constraint, because everything was going so fast, and they were so crammed trying to put everything into iPad because switching from elearn to an iPad-friendly format is the translation they are having difficulty with for the most part. Everything is there on e-learn already from previous semesters, because they have used e-learn for a couple years now, but getting it to translate into iPad-friendly format is the problem they are encountering time and time again.

- I like the note aspect of it. Cause I always have problems with notes and I will miss half the content but most teachers are ok with you pushing record on this

- The load on our shoulders is a lot less. That's for sure. Carrying this around rather than a backpack load of books. Less back strain injuries. Being in the millwright aspect of things, it's an age-old trade, passed down for years and years and years and now that they are passing the information through the iPad it might have more beneficial aspects to it because we are more portable in this day and age.

- There were a few guys who would forget stuff now and then. But this makes it really easy to be prepared for class. Like he said, you are not dragging all kinds of stuff around. When I had building code, mechanical and a bunch of other things, I had two massive building code Ontario binders and I had to have textbooks in my bag as well. Sometimes I would show up to law class without my binders…yes, bring them, I know, I just didn't have the energy. I haven't had my coffee yet.

- Eliminates forgetting projects at home as long as you remember to upload it. But that could be done with a computer.

- Here's a good thing. This can be mobile. You can be learning anything anywhere, you can be out.

- Yea, and if I walk into Tim Hortons, while sitting down with my coffee, I could be doing a business report or something that's due that day. It does bring more mobility. It's less bulky that a lap top for sure. For the most part I don't find the small screen that big of a hindrance. You can always blow it up. Makes it easy. Whereas on a laptop if the picture is too small; like netbooks, the small screen is really small, if the picture is too small, and trying to enhance, it just gets pixelated.

Discussion regarding clickers

- No, where it's surveys and that… that was cool
- Researcher- do you mean the clickers?
- Yes, eclicker
- Yea – makes you feel like a part of the class
- Researcher - engages you a bit more?
- Yes, it did.

Re: e-textbook

- Well, from the content, we are able to upload the actual PowerPoint's into iBooks and we have that as permanent storage in our cloud platform. I guess is where all the information goes

- With the e-textbook that we purchased. More or less that was our go-to guide for our first semester for doing any machining or for our tests in manufacturing processing, and what not. They kept it open book, which was pretty good. As long as we knew where the

information was, we could answer the questions and get pretty close to perfect on the tests and quizzes. For the most part it is up to the student to learn how to use the iPad to the best of his abilities to assist him in his learning experience like, a lot of guys will put their notes into notability so they can make little footnotes and whatnot on the screen; I prefer to just load it into iBooks and have a hard copy of it indefinitely. And then any side notes, I have in my notepad.

Re: Discussion about safety issues

- For the most part, we were told don't bring your iPads to the shop, but our instructor put each step of the process of creating the metal object that we are supposed to do online so we could watch it and a lot of students bring it to class anyway and they watch it as they are trying to do what's supposed to be done.
- Which is unsafe. You should not be watching a video while you are running a machine. You are going to stop it and walk away.
- That's common sense.
- There are safety protocols that are being infringed on because they are bringing their iPads into the shop. Guys will come over while you are machining and they will be like, I don't understand this, and they are trying to show it to you and you are trying to look at your part that is going around a mile a minute in the lathe and it's like, just back up a minute and let me stop the lathe and I will answer your question

Re: Discussion about iPad insurance and bring your own device

- If these were insured by the school, like a library book, that would be a lot better, I've already had one stolen and other people have had them stolen and if the school does that with Apple or whatever company…
- Oh, next semester they are bringing in BYOD, bring your own device
- Now there will be kids with the cool one, and kids with
- Cheap end…but it has to all be compatible with D2L platform. So everything gets transferred in.
- They are not forcing the iPad any longer. They can bring whatever one they want - Samsung, Galaxy, Blackberry tablet, the Windows, the Google
- Just get a lap top.
- Also, if the school's insuring them and distributing them, we could have them in the shops without too much worry.
- Right now this (refers to his iPad) is still school property. We don't own this even though we had to pay for it. It's not ours until we graduate our course.
- It's like someone bought a skid of iPads and couldn't sell them on eBay. So let's dump them on the education system (laughs) It's probably not that far off.

Re: Discussion about choice of iPad brand

- I kind of like the iPad. Just because I have an iPhone. They are really intuitive. It doesn't take a huge amount of brainpower to be able to understand how it's going to work. If I think, "oh it is probably going to do this," it usually does.

- I don't hate iPads. I wanted a choice. I felt like I had no choice.
- One of the guys in our class dropped his. He is on OSAP like the rest of us are. He does not have cash to go out and buy another iPad. He is still working with a cracked screen. That's his iPad now.
- Whereas if it were insured with the school, he could take it back and replace it.
- Well, take care of your stuff, right? 99 percent or 90 whatever percentage of us that work, that function better
- Out of all electronics though, this is probably the highest theft item.
- It's a big piece of jewelery. With identify theft, people come along and pick up your cell phone, walk away with it, they have everything now.

Re: Value of technology to work

- The strangeness. One strange encounter I have had, during an interview, I had mentioned we were on the iPad to the interviewers. They had no idea we were learning everything through blended system and through the iPad, and I asked them if there would be any use for my iPad out in the workforce when I am there, and they said that's news to us and no, you are not going to be able to use it because you are going to be in an industrial environment - working with hot steal and one splatter and your screen is gone.

Re: Technology issues

- In some, some of the translation from elearn to the iPad, it gets lost. One of the video tutorials one of our instructors had put up, the speech cut out half way through and you were trying to follow along what he was doing in automation studio, one of the pneumatic programs being taught, and if there is no speech you don't know what he is clicking because the cursor is stuck at the top of the screen and he's talking but you don't know what he is saying.

- And there were problems with a few of our CAD tutorials cause I was absent for a couple of weeks and I had to do everything I missed through tutorial and CAD. Trying to get it to play and then pause it, and then do what he had shown you, and then go back to try and continue, you would have to reload the whole video up again and watch it from scratch and then remember where you had left off.

- Yes - E-learn went down for one of our tests. We had to reschedule for after the break because none of the photographs that we had to match portions for, got uploaded, or there was a problem with the links… when they had the power surge.. or at least that's what they are saying it was to us and the instructors.

Re: Blended learning

- One of the really good things is we had access to most of our lectures before they would teach the lecture. Right? So, we could look over our notes and then I could kind of have an idea in my head, a head of time, "ok, I don't understand this so I'll have to ask some questions about that."

- Wonder if it pushes the maturity up in the classroom; wonder about classroom with no older students if it is a lot harder for the teacher to keep control. There seems to be one group.

- Skype or something - I never actually talked to him on it, but he always said, and he has little icons that notify you, stuff like that if teachers were doing that that, they could eliminate the classroom all together.

Re: Discussion about attendance at lectures

- Somewhat, somewhat, as we have noticed a reduction in people coming to the actual lectures.
- This past week only 4 people in his lecture class
- It kind of goes by the students too right, if they are going to slack, they will slack. If they (interrupted)
- if they know they have that lenience, they might take advantage of it too, and I think a lot of them are.. but that is their own downfall, in my aspect.

Re: Discussion about doing quizzes before tests

- Another thing about the whole blended learning thing – we have a test coming up on Tues and they will give us a practice test, and we can do this as many times as we want. And, they will take a pool from those questions and a random selection will be our test. But, our teachers also know, they can go in and can see oh, so and so didn't bother to do it even once. So, when you fail the test, and you show up, they can look at you and say you didn't even do this once, sorry,
- we're not going to help you
- But it you have gone through it 10 times and still don't understand, they will take the time to help you. So they know who's doing things and who isn't. They can even look at the tutorials and they know how much time you spent watching this tutorial. So, if you just try and click on it and close it, and be like, they'll see one second. You watched this for one second?
- For our industrial maintenance course this semester we were more or less forced to watch videos as a portion of our mark. If we don't watch the video we don't get those marks. And, it's cued up so it knows if we watched the whole length of the video. And then it prompts the next one to populate in the system so we can continue our progress.

Re: Discussion about doing work in advance of class

- No, I can't prepare for what I don't have the information for
- And if a teacher were to say next class we are doing Unit 8, pages such and such, I wouldn't bother – we're going to do it in class anyhow.
- Researcher - so, why do you do it now?
- Cause I'm that guy.

- ‘Cause you like to have that advantage and prepare your questions for the instructor. ‘Cause half way through you don’t want to be rushing and writing things down and then you are missing content from the lecture.

Re: Discussion about reduction of lectures

- These should have really reduced lectures though and opened up more lab time and that never really happened
- Yes
- Researcher - do you feel you could have done with fewer lectures
- Yes, with this, we could…

Re: Discussion about use of time in class

- If everybody was willing to read the material ahead of time, we could just set aside maybe half an hour for question and answer
- Instead of 1 ½ hour lecture for the whole slide show and then 15 min for q and a.
- More individual

Re: Comments on value of coming to class

- (on value of repeating lecture that was online in the class) But, it reinforces it. For one. And I could ask my clarifying questions. And, honestly, if I read it and get it all, I don’t have to go to that class and I could spend my time working on an assignment instead. But I still did. Near the end of first semester, some of our classes, there would be 8 people. For a lecture, where there’s 60 people who could be there, there would be 8, 10 or 12 people. Because people would just read on their own.

- Yea, he explains the slide a little bit more. He puts the words in for you so it is beneficial to show up to class. If it was an audio presentation, it might further go into the blended learning aspect of things, and then take us out of the classroom where we have to watch a tutorial to find out what the test is going to be on, whereas right now our tests are on these PowerPoint slides.

- You can’t ask a slide a question, right.

- I think there is still a necessity for a face to face instructor time

- But not as much, now we have this as a utility and as a teaching device, because they can pretty much translate everything we need to know into the iPad, and if we do have questions then they would provide us with, maybe one portion of a day out of the week where we could come in and pose questions and that would be specifically just us one on one with the instructors, these are the problems I am having and understanding this information, can you clarify this for me.

- For AutoCAD I could just do tutorials at home and it wouldn't make a difference if I even went to class at all,

- But for some of the math heavy or hydraulic stuff, or really concept heavy stuff, I need to be in the class I need to have the teacher explain it to me. Because a lot of times the things that are posted online, he explains it in a lot more depth for us, right

- I have heard the promise of smaller classrooms, that I have heard about since I was a kid, but I've only seen them increase in size. I might bring that around. Also, it's nice to have a teacher, not necessarily the classroom, but the teacher, because the teacher can watch you while they are explaining something and see which point you are starting to, to
- if you grasp it or lose it.

- I just missed 2 weeks because of a family incident, so I was not in class for two straight weeks, but all the work is there. I can do it all. I might have to go back with a few clarifying questions, here and there, but all the information is there. It's up to me now to get caught up.

- Last semester I missed two weeks due to illness and I was able to stay caught up because of the iPad. It would give me warning when things were coming due. So I would jump on the computer. As sick as I was I could still sit at a desk and plug things away but I didn't want to come here and get everyone else sick.

Re: Impact on learning

- So it made the process a little bit quicker just because, if you already know, if you are up to speed, then you can ask more, more…
- Researcher - in-depth questions?
- Yea

- I'm a hands-on person. I need a lot of change. If I am in the same room every day reading the same thing, I just want to start banging my head on something.

- So there's a big benefit to going to the classes. Whatever, my grade. When I see the person in front of me, I learn more, I learn better.