21st Century Competencies and ICT Integration in the Classroom:
Preparing Students for Careers in the Current and Future Employment Market

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Abstract

In this research project, three educators in the Toronto District School Board share their understanding and perspectives of 21st century teaching and learning, a broad term which exists in current educational research literature and pedagogy. The main research question that was investigated was: How is a sample of teachers understanding and implementing "21st century" teaching and learning in the classroom? The educators in this study work in one or more of the various grade divisions: primary, junior, intermediate, and senior. Participants were interviewed using a semi-structured interview protocol. The research findings align with existing research in the area of 21st century skills, career-relevant instruction, and the integration of information and communication technologies (ICT) into the classroom.

KEY TERMS: 21st century skills, global competencies, career-relevant instruction, ICT, skills gap, creativity, critical thinking, communication, collaboration, citizenship, character education, student engagement, problem solving
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Chapter 1: Introduction

1.0 Research Context and Problem

Given the climate of technological and economic innovation and the rise of the creative class, the job market has changed unimaginably over the past 100 years, with the most recent decade giving way to a multitude of careers that previously did not exist (Pompa, 2015). In this context, it is important that teachers in the various school systems of Canada need to consider the ultimate goal of their profession and the methods they can employ to be successful in preparing students for an uncertain and undetermined world. This may not be an everyday thought process for teachers, but it should be something floating under the surface of everything they bring into the classroom. Common knowledge would indicate that teachers play a strong role in helping students become responsible and active citizens. In the 21st century classroom, teachers are partaking in the traditional role of knowledge transmitters less frequently. Instead, teachers around the world are taking a skills-based approach to education to prepare students to build careers and be active citizens after completing school (Sahlberg, 2010). Thus, it is important to minimize any gap between knowledge and skills learned in school and knowledge and skills required by careers in the future. In undertaking this process, all students are unique, requiring a differentiated learning approach for their progress in relation to the curriculum, as well as their knowledge and skills relevant to the 21st century.

In elementary and secondary education, teachers may focus on preparing their students for further education that will lead to career pathways available in the current labour market relative to national, provincial, and local economies. With that in mind, career opportunities are constantly changing. For this reason, jobs that people made a living from in the past no longer exist have been replaced by newer technologies and changing societal needs. Social trends that
include globalization, technological innovation, and the convergence of fields are among the highest levels of impact to the workforce (Pompa, 2015). Technological innovation is a major factor in determining the jobs of tomorrow, creating new careers in areas such as smartphone app development, social media, and cloud computing (Casserly, 2012). As teachers, we need to teach learning skills and foster interests that have a high likelihood of transferring to new and emerging careers. For this reason, teachers and schools have the complex duty of engaging students in fields of interest applicable to current and future markets, without narrowing curiosities for knowledge, creativity, and exploration.

When considering the career pathways of individuals with postsecondary degrees, there is a difference between unemployment and underemployment. The unemployment rate for any specific group refers to the number of people unemployed as a percentage of the labour force (Statistics Canada, 2014). The Canadian Teachers’ Federation (CTF) states that the unemployment rate for youth between 15 and 24 years of age was 13.7% in 2013, compared with 5.9% for workers between 25 and 54, the second largest gap since 1977 (as cited in Statistics Canada, 2014). As opposed to unemployment, underemployment refers to people working jobs for which they are overqualified. Unemployment rates do not represent this category of workers. CTF points out that the underemployment rate for youth aged 15 to 24 is more than double the unemployment rate (as cited in Canadian Labour Congress, 2014). This indicates that the current Canadian labour market is not meeting the employment needs of recent graduates. From a human capital perspective, postsecondary graduates employed in a job they are overqualified for could be viewed as a waste of resources. In comparison with other nations, Canada ranks poorly in terms of skilled workers in overqualified position; six percent higher than the OECD average.
Therefore, there is a need for teachers in Canada to help their students develop skills and build knowledge that corresponds to highly-qualified work in various fields.

1.1 Purpose of the Study

The goal of my research is to study and learn how teachers are making classroom instruction career relevant for students by helping them develop competencies that are necessary for highly-skilled employment. As teachers, we want to direct our students towards successful careers when they finish school. In today’s job market, the fundamental nature of careers has changed, with most individuals following nonlinear career paths with less job security. Individual career paths are influenced by personal work values and the transferability of skills (Sullivan, Carden, & Martin, 1998). Education in certain fields has proven to reduce underemployment for university and college graduates. In Canada in 2011, one third of working people between ages 25 and 34 with a university degree in humanities were employed in jobs requiring a high school education or less. Comparatively, those with degrees in health, architecture, engineering, and related fields had an underemployment rate below 15% (Uppal & LaRochelle-Côté, 2014). Ultimately, the fields students choose to pursue could be determined by numerous factors, including personal interests, parental influences, classroom experiences, media, culture, among others. I want to explore how teachers identify and help students develop 21st century competencies that are cross-curricular in the classroom and cross-disciplinary in the workforce. Moreover, I want to discover what educators are already doing to engage students and hear from them what they have observed to be the effects of these competencies on student success. Learning from these educators, I want to discover what they perceive to be relevant, career-based competencies, and how they teach these through their everyday classroom practice.
This research study focuses on “21st century” teaching and learning through the development of specific competencies. The terms “skills” and “competencies” are used both distinctly and interchangeably, however there is a difference between the two. According to the OECD (2003), “A competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context.” Therefore, the use of “competencies” in this study, research literature, and policy frameworks is intentional, as the knowledge, skills, and attitudes students may develop have relevance in various contexts beyond the classroom.

1.2 Research Questions

The major question I address in this research study: How is a sample of teachers understanding and implementing "21st century" teaching and learning in the classroom?

The following questions will support the main research question:

1. What skills do teachers identify as critical for their students to developing 21st century competencies?

2. How are these teachers using ICT effectively to help students develop 21st century competencies?

3. What curriculum resources and/or professional development opportunities support these teachers in their efforts to integrate 21st century competencies and ICT into their classrooms?

4. What obstacles have these teachers encountered integrating 21st century competencies and ICT into their practice?
1.3 Background of the Researcher

As a teacher candidate with uncertain job prospects, this issue is extremely relevant to my interests as an aspiring teacher and researcher. In my undergraduate education, I completed a Bachelor’s degree in journalism from Ryerson University. Journalism, like education, is an industry heavily influenced by globalization and technological innovation. It is evolving as an institution to adapt to the changing social, political, and cultural world. Transitioning from analog to digital, passive consumption to user-generated content, stationary to mobile platforms, and local to global, journalism is a prime example of a field requiring those who undertake it to possess transferable, technology-driven skills (McNair, 2009). About halfway through the four-year program, while I still enjoyed it and excelled in many areas, I started to realize that my long-term career interests lay elsewhere. Nevertheless, I chose not to switch my program or drop out of university. I do not regret choosing to study journalism or complete my degree, because the skills I learned in media, technology, and collaboration transfer to educational and career contexts beyond the newsroom.

As a teacher, I would like to investigate the career-relevant and global competencies we can teach students to help them pursue highly-skilled careers and become active citizens. Just as I switched career paths and explored numerous interests, today’s students may experience the same thing. My decision to enter the journalism industry launched from an experience during Take Your Kids to Work Day in grade nine. This is a day for students in Ontario to accompany a parent, guardian, or other adult to a workplace to observe and take part in an average (or not-so-average) workday. I accompanied my aunt to her job as a news reporter for CityTV News, in the busy and exciting CHUM building in Toronto. Experiencing the fast-paced atmosphere of a busy newsroom, meeting all the people who contributed to this machine, and watching it unfold in real
time led me towards this career path. The industry has changed tremendously since that day in 2005, and I imagine that newsrooms look quite different today. Throughout the rest of my years in high school, I continued to develop an interest for television production and broadcasting, and when I applied to universities, this memory is what led me towards journalism.

As a student and teacher I continue to be interested in various disciplinary areas. For example, I have always had a passion for science and technology, but in grade 10 I became less motivated to pursue it due to a classroom structure focused on rote memorization and direct instruction, rather than inquiry and experimentation. In contrast, courses like history and drama kept me engaged, because I developed interpersonal, critical thinking, and problem-solving skills. In university, journalism was a skills-based program, and our instructors encouraged us to explore interests in other areas that could strengthen our ability to report, analyze, and critically examine news, culture, and society. I chose to take elective courses in history, science, economics, psychology, among others. I hoped that knowledge and skills I learned in each area would cross disciplines and help me become a better journalist, thinker, and person. As a 21st century teacher and educator, I want my students to experience cross-curricular learning in school that will help them in their lives and careers. Through my research, I hope to reflect on the career-relevant competencies my teachers helped me to develop, and discover the ways in which current and future teachers can prepare students to adapt to a changing and uncertain world.

1.4 Preview of Whole

This research paper contains five chapters: Introduction, Literature Review, Methodology, Findings, and Implications. The introduction highlighted the problem of changing job markets and nonlinear career paths. It also discussed the importance of researching this issue
and contributing to the role of pedagogical methods in 21st century competency development and the gap between classroom and work environments. In the following chapter, I will review the literature surrounding the identification and development of competencies, as well as content area relevant to current and future career prospects. I will discuss how teachers already focus on these implications in their methods, and what is missing that contributes to this problem of unemployment and underemployment. In addition, I will highlight the role of ICT in relation to these competencies and the learning environments that support them. In the methodology, I will elaborate on the research design. This includes a qualitative research study, in which I will interview three educators and explain the parameters for my decisions. Following that, I will report my research findings. This includes new insights from current teachers and educators on their role in educating the next generation of highly-skilled workers and active citizens. Finally, I will discuss the significance of these findings and their relation to the literature from previous researchers. I will conclude by considering how these findings will relate to my own teaching strategies and reflexivity as a beginning teacher and educational researcher.
Chapter 2: Literature Review

2.0 Introduction

In this chapter, I will begin by reviewing the literature concerning the societal and personal purposes of education (schooling) in the 21st century—as an institution for moulding future workers or instructing students to determine and achieve their full potential in life. Next, I will explore established practices of engaging students in the curriculum by making it relevant to their lives and potential careers. I will then look at the literature concerning transferable competencies in the 21st century that current and future employers in different fields will expect from employees. As I stated at the beginning of Chapter 1, teachers should consider the ultimate purpose of their profession, as they seek to educate and impact each student who enters their classroom. This research supports the notion that teachers and educators play a strong role in preparing the workforce of tomorrow.

2.1 The Purpose of Education

To state that education’s only purpose is to prepare students to meet the employment needs of a current and future economy would ignore important aspects of schooling, such as individual enlightenment and character development. American educational philosopher Mortimer Adler integrates the works of his predecessors John Dewey and George Counts to develop a purpose for schooling based on democracy, experience, freedom, and social welfare (Counts, 1978; Dewey, 2004). Adler highlights three significant purposes of schooling: the development of citizenship, personal growth or self-improvement, and occupational preparation (Adler & Isaacs, 1983). Career preparation appears within the purposes of education, but building school systems based solely on available jobs perpetuates and initiates students into the
existing social order. This neoliberal approach to education creates socially exclusive and
harshly competitive environments that are inequitable for students from marginalized groups,
such as students with exceptionalities, minorities, or from low-income families (Parekh, Killoran
& Crawford, 2011). Therefore, this research study emphasizes 21st century teaching and learning
within the context of careers, but it does not define public education as only preparing students
for careers, as the competencies I highlight extend to citizenship and other aspects of living in a
democratic society.

Through examining the literature, I argue that career preparation is a significant goal
which fits into the ultimate purpose of education: meeting the self-actualization needs of the
population. In Abraham Maslow’s “A Theory of Human Motivation” (1943), he establishes a
hierarchy of needs that humans engage in fulfilling. The most basic of these needs are
physiological needs, such as food, water, oxygen—the fundamental needs to survive. Maslow
follows physiological needs with safety needs, love needs, esteem needs, and culminates his
hierarchy with the need for self-actualization. Maslow contends that this need is the discontent
humans might experience after they satisfy all of their lower-order needs, but seek to determine
and fulfill their potential. “A musician must make music, an artist must paint, a poet must write,
if he is to be ultimately happy. What a man can be, he must be. This need we may call self-
actualization” (Maslow, 1943, p. 382). As teachers and educators, we want our students to be
healthy, feel safe, loved, confident, and ultimately determine their passions in life. Individuals—
child, adolescent, or adult—who figure out their life’s purpose, and can even make it their career,
are fortunate. For the rest of the population who will explore various careers and fields of
interest, a goal of schooling is to prepare them for entry into the employment market with a
dynamic skill set their generation requires.
The skills, knowledge, and demands that employers around the world are looking for are constantly changing. Therefore, it is a difficult and challenging expectation for educators to help students develop skills, learn knowledge, and prepare for careers that could change in five, 10, or 20 years (Pompa, 2015). Usually, educators are more focused on the daily demands of their jobs than long-term concerns (Bass, 1997). Nevertheless, it is an important and required goal for educators who wish for the next generation to preserve, adapt to, and improve their society. The problem and limitation of making self-actualization the long-term goal of education is it assumes that each child enters the world with a genetic, predisposed purpose in life that is independent of educational influence (Ivie, 1982). Maslow even admits that self-actualization is an ambiguous concept and is rare among human beings. It is an impractical and unrealistic expectation for teachers to develop in their students, and an example of a psychological concept misunderstood in teacher education (Ivie, 1982). A more realistic long-term goal for educators is the development of competencies and career-based attributes relevant to the demands of the current and future globalized society.

Even if students’ self-actualization is an unrealistic goal for educators, career preparation, while important, is not the end product of education. The end product, which educators must clearly define, is to develop in students the ability to contribute to and enjoy life in contemporary society. This includes the ability to think critically, appreciate culture, develop values and societal conscience, and interact with others on multiple levels (Campbell, 2008). This research focuses on the career preparation aspect of education that provides students with the opportunity to contribute to contemporary society on a personally satisfying and societally economic level. According to Maharishi Mahesh Yogi (2008), “there are tremendous latent possibilities which are never unfolded by young people during their student life, the most precious time for laying
the foundations of their careers” (p. 228). Education allows students to explore and let their curiosity wander through potential careers that are relevant to modern society.

### 2.1.1 Education as Career Preparation

American founding fathers Benjamin Franklin and Thomas Jefferson held views that education should serve the practical purpose of mobilizing the middle class. A foundation in basic subjects, such as mathematics, language, and natural philosophy, as well as good morals, and financial literacy, would provide any man with the ability to succeed in business and the professions (Herr, 1987). This view does not eliminate education for the purpose of individual enlightenment, such as learning abstract academic knowledge. However, the institution of public education, funded by taxes, should serve the pragmatic purpose of preparing students for work in the industries they choose to pursue.

Education for work involves both technical skills necessary to the performance of work and self management skills which include decision-making ability, job search and access skills, skills of adaptation to the work environment and to co-workers, the ability to deal with supervision and the work habits or work norms which describe a particular setting. (Herr, 1987, p. 21)

Later in this chapter, I will review the existing literature concerning the skills and abilities that are currently relevant to work in the 21st century. When referring to career-based education, this should not be confused with vocational, or trade-specific, education. Vocational education, which is more common in secondary schools, refers to education and courses specific to a trade or occupation (Herr, 1987). There are vocational education opportunities for students available in many industries, such as automotive, engineering, nursing, retail, construction, culinary arts, and more—many of which include co-operative education or apprenticeships. Career education does
not seek to undermine vocational education, but to make all levels of learning and academic instruction relevant to the occupational aspects of human development (Herr, 1987). Even students who choose to pursue a trade-specific education will require fundamental skills, such as reading comprehension and mathematical ability (Herr, 1987). Thus, career education will provide students with fundamental skills that they can apply and transfer to any career they are interested in pursuing.

The Ontario Ministry of Education is committed to this approach to education by maintaining a high standard for its educators and teachers, in which students are engaged in their schools and classrooms to become actively, involved citizens when they graduate. Achieving Excellence: A Renewed Vision for Education in Ontario (2014) clearly outlines this objective:

By raising expectations for what our education system can accomplish, Achieving Excellence can help uncover and develop the potential of all learners. It will reveal their hidden gifts and spark new passions for future careers. We can develop compassionate and actively engaged citizens who graduate high school equipped for the technology-driven, globalized world. They will be well-rounded individuals who have not only strong basic skills but also the critical thinking skills, imagination and resilience to excel in – and create – the new jobs of tomorrow. (p. 20)

Creating inclusive classroom environments, where students are engaged in their learning, is a goal every teacher should strive to achieve. By making lessons, projects, and other school experiences more relevant to students’ lives and possible careers, they will be more excited and in control of their learning, as well as more likely to achieve high academic achievement (Orthner, Jones-Sanpei, Akos, & Rose, 2013). Ontario’s education system sees this approach as a key avenue toward students achieving greater personal and professional success. In a subsequent
portion of this chapter, I will examine the literature that supports relevant, career-based teaching and learning.

2.1.2 Skills Gap Between School and Work

Later in this chapter, I will explore in greater depth what the current literature identifies as career-relevant 21st century competencies. Globally, each nation finds itself with its own skills shortages and mismatches that affect its overall employment trend (Pompa, 2015). This indicates a learning gap between skills students learn in school and the skills employers require. In the North American public education system, there are still many instances in which students are learning and developing skills the same way their parents, grandparents, and great-grandparents did. They are still sitting in rows, listening to lectures, handwriting notes, and reading out-of-date textbooks (Wallis, Steptoe, & Miranda, 2006). These are teaching approaches, classroom designs, and learning skills that were commonplace in the 20th century, and are still experienced by students today. Around the world, the service economy is rapidly replacing the industrial economy, creating jobs driven by information, knowledge, and information. Technology is making routine jobs obsolete, giving way to non-routine and higher-level thinking jobs, in which possessing a university degree is not enough to secure work (Bellanca & Brandt, 2010).

The gap between skills learned in school and skills required for the future workforce will continue to exist unless educators can identify which skills are relevant to their students. The current literature forecasts in-demand skills and competencies that students will need to work in a globally-connected and technologically-advanced world. Ten highly probable skills for the future workforce are: sense-making, social intelligence, novel and adaptive thinking, cross-cultural competency, computational thinking, new-media literacy, transdisciplinarity, design
mindset, cognitive load management, and virtual collaboration (Davies, Fidler, & Gorbis, 2011). From a Canadian perspective, there is a controversy of opinions and data suggesting whether skills shortages and mismatches are reaching critical levels. The Canadian Chamber of Commerce (2012) indicates that skilled job vacancies will continue to increase, as the overall gap between workers needed to maintain economic growth outpaces the number of workers available over the next 20 years. By the year 2020, they project that this gap will be greater than two million jobs. In a 2014 report, the Canadian Chamber of Commerce identifies literacy, numeracy, technological literacy, and problem solving as priority issues to improve the transition from education to employment in Canada. The occupations that most commonly report labour shortages due to skills gaps are in STEM (science, technology, engineering, and mathematics) fields, such as engineering and health, as well as skilled trades (HRSDC, 2013). Producing more skilled workers in science, engineering, and trades was a sentiment reinforced by former Prime Minister Stephen Harper (Morgan, 2014). The lack of consensus is that critics of Harper’s government claimed that the urgency of Canada’s skills gap was a political justification for the foreign temporary workers’ program, stricter unemployment eligibility insurance rules, and the Canada Jobs Grant (Wright, 2014). Canada’s Parliamentary Budget Officer reported that there is little evidence to support a national labour shortage or skills mismatch (Bartlett & Lao, 2014). Furthermore, these skills mismatches could be in isolated job markets like Saskatchewan and Alberta (Millar, 2014). Whether the skills gap in Canada is at a critical level, teachers still have to evaluate and improve their role in developing skills and preparing students for employment in the future.
2.2 Career Relevant Instruction

If an important goal is to prepare students for life after they leave school and find careers that meet the needs of the economy, then the educators who maintain this goal are designing lessons and activities to reflect this approach. Building on students’ previous knowledge and life experience—schema—and explicitly relating skills and content to practical situations are methods teachers can employ. In taking this approach, it does not mean that teachers will instruct students in specific skills or knowledge applicable to only a few career paths. The current state in many workplaces point towards more short-term and contract positions, with people changing careers more often than in the past (Workpolis, 2013). Therefore, teachers committed to relevant teaching seek to emphasize general attitudes, values, and lifelong learning skills for many careers and positions (Hargreaves & Moore, 2000). In Hargreaves and Moore’s study, they interviewed and observed 29 grade seven and grade eight teachers working in the Greater Toronto Area. This research provides some concrete insights into the experiences of teachers using curriculum integration to engage students and make learning more relevant:

Teachers organized units that made connections with real issues in students' lives and with people, ideas, and events beyond the boundaries of their classrooms. They took their students physically into the community through field trips, or ventured into the community imaginatively through role playing or simulations. They brought the world into their classrooms and took their classrooms into the world. (Hargreaves & Moore, 2000, p. 95)

By focusing on the relevance to future work in their classrooms, these teachers taught practical skills and knowledge their students would need for their careers. These teachers could not predict what the world would look like for their students upon entering the workforce, but they knew
that experiences in the workplace are cross-curricular, so they should reflect that in their teaching. From having students create and reflect on personal portfolios, to researching and analyzing different careers, incorporating cooperative learning, simulating work experiences, and bringing in business partners, these are all tangible examples of relevant career-based learning (Hargreaves & Moore, 2000). The authors of this research study highlight the concern that when teachers bring career-based learning into their classrooms, they must be careful that their students do not become accepting or uncritical of problems that exist in the corporate world, such as gender or ethnocultural inequities. Teaching critical thinking as a significant competency students need for their future careers includes teaching them to be critical of institutions as a whole. As teachers, we should hope our students graduate school and canvass for positive change in the world.

Relevance in the classroom is a significant approach to teaching and learning that will help relate curriculum expectations to future needs, including required employment skills and knowledge. Hargreaves & Moore (2000) and Orthner, Jones-Sanpei, Akos, & Rose (2013) support the idea that students who can explicitly see the relevance in the content they are learning will have increased motivation to learn and higher performance. To improve their achievement, students must understand the practicality and utility of the instruction, so that they can activate their schema and accommodate the new learning (Means, Jonasson, & Dwyer, 1997). This approach to classroom instruction originates in the ARCS (attention, relevance, confidence, and satisfaction) model developed by John Keller (1987). This is a systematic design process in which meeting the four conditions will motivate people and keep them motivated. Another example of incorporating occupational examples into teaching instruction focused on a program called CareerStart, in which middle-grade teachers used examples of adults in the
workplace applying lesson content to accomplish tasks or solve real-world problems (Woolley, Rose, Orthner, Akos, & Jones-Sanpei, 2013). In this study, six-to-eighth grade teachers in seven of 14 schools in a North Carolina school district implemented the CareerStart program across four core subjects—mathematics, science, language arts, and social studies. The study found that students in the seven schools who received career-relevant instruction demonstrated significant achievement in mathematics. The researchers assert that these gains are the result of career relevance across all of the subjects, which increased student engagement, interest, and motivation to learn. Despite the small sample size of this study, it provides a clear example of the effects of integrating career-based learning into lesson design and the curriculum.

Relevance in the Middle Grades

Figure 2.1: CareerStart model (Woolley, Rose, Orthner, Akos, & Jones-Sanpei, 2013)
2.2.1 New and Emerging Careers

For teachers and educators to help their students develop career-based competencies, considering the types of jobs and fields that will employ the highest number of workers in the future is important to keep instruction and assessments relevant. Pompa (2015) identifies six key sectors that will continue to expand and provide the highest number of jobs in the next decade: health and social assistance, construction, technology and big data, manufacturing, hospitality and tourism, and the creative industry. Globally, each of these rapidly expanding sectors relate to socioeconomic trends influencing 21st century competencies. For example, in the health and social assistance sector, a number of trends are increasing demands and costs for healthcare. The most common are aging and growing populations, longer lifespans, widespread chronic diseases, emerging-market expansion, improvements to infrastructure, and advances in modern medicine (Deloitte, 2015). Just as these global trends are influencing the health and social assistance sector, technology and big data are embedded within every sector and modern workplace. Big data refers to the insights that individuals or large companies can extract from analyzing massive quantities of information to change markets, organizations, governments, behaviours, and more (Mayer-Schönberger, 2013). People with ICT skills will continue to be in growing demand as technology and big data bring quantitative dimensions to fundamental aspects of life (Mayer-Schönberger, 2013). Similarly, creative industry is a broad term for types of work infused in numerous sectors. These include goods and services relates to arts and culture, as well as innovative research and software development (UNESCO, 2013). The sectors and industries I introduced in this section are areas that have become prominent in recent years and will most likely continue to surge when today’s students enter the workforce.
From a Canadian perspective, I will explore some examples of emerging careers that are currently in demand. The purpose of this is to bring forth jobs that require 21st century competencies, so that educators are aware of some of the careers their students will pursue. Human Resources and Skills Development Canada projects that new job openings due to economic growth will be mainly high-skilled positions, with the fastest growing occupations in the oil and gas sector, as well as in healthcare (2011). Examples of jobs in these expanding sectors are physicians, nurses, dentists, veterinarians, mine service workers, and production managers. In addition to jobs in established companies in the public and private sector, many Canadians are launching start-ups to build their career. The Canadian Imperial Bank of Commerce (CIBC) reported in 2012 that half a million Canadians started their own business that year (Tal, 2012). And while the report notes that more than half of those businesses will fail within five years, it is still an indication that many Canadians are choosing to self-employ themselves instead of or while completing postsecondary education. Institutions such as the University of Waterloo and Ryerson University’s Digital Media Zone (DMZ) have embraced this trend to support students with the ambition and passion to become entrepreneurs while simultaneously working towards a degree (Taylor-Vaisey, 2014). For any of the possible career paths students decide to take upon graduating secondary school, a broad range of competencies within the classroom and curriculum are relevant to these occupations and fields.

2.2.2 Career Relevant Instruction for Jobs that do not Exist Yet

When it comes to making education career relevant for students, there is a paradox in teachers preparing them for jobs and careers that are yet to exist. Many of the rapidly growing in-demand jobs for young professionals—especially in technology, social media, and mobile applications—have come into existence within the last decade (Workopolis, 2013). If teachers
cannot be certain about the jobs, technologies, problems, and type of work students will undertake, it will be challenging to teach skills and content that is relevant to future careers. Public speaker and educationalist Ken Robinson highlights this phenomenon as one of the two main reasons for international reform of public education. Countries around the world are faced with the problem of educating children to take a functional role in the economies of the 21st century, when it is immensely difficult to anticipate what the economy will look like when they enter the workforce (Robinson, 2008). Maryellen Weimer (2002) addresses this challenge by making the distinction between teachers facilitating learning and teachers developing learners. Rather than teaching students a specified amount of knowledge, for which the relevance to their future lives is undetermined, there is a shift to teach students how to learn, so that they can use the knowledge and skills they learned inside the classroom to continue learning outside of it. These 21st century competencies are the bridge between career relevant instruction and uncertain careers.

2.3 Twenty-First Century Skills

If teachers want to make their instruction more career relevant and practical for their students, they need to know which essential skills will be transferable across different fields of work in the 21st century. It is evident that certain skills and knowledge will be necessary for students to develop to be able to work and contribute in a globalized information society. Let it be clear that most of these 21st century skills, like critical thinking and problem solving, are not new. The relevance of these skills is that changes to the global economy and career trends have brought them to the forefront as requirements of employability and individual success (Rotherham & Willingham, 2010). However, it is uncertain what skills will still be relevant by the time they graduate and start their careers. Concepts like “information literacy” are necessary
for new curricula (Blurton, 1999). In the current and future economic landscape, 21st century teachers prepare students to think and work together in ways applicable to the jobs they will undertake. Trilling & Fadel (2009) outline the challenges for students entering the workforce in the 21st century, and thus, the challenges for education in preparing them. In today’s world, education is the key to economic survival. Countries need citizens with the ability to become expert knowledge workers—something anyone can do with a device and an internet connection, but not without the functional skills and expertise. The challenge of producing these types of workers is placed upon educators, because employers expect people to have a certain set of skills before hiring them.

If all these changes weren’t quite enough, students in school today can expect to have more than eleven different jobs between the ages of eighteen and forty-two. We don’t know yet how many more job changes to expect after age forty-two, but with increasing life expectancy, the number could easily double to twenty-two or more total jobs in a lifetime! (Trilling & Fadel, 2009, p. 10)

Therefore, with constant job changes and businesses always hiring new employees, people cannot expect that companies will hire them and train them in these skills. They will need to acquire them before entering the workforce if they wish to have a competitive advantage in applying and interviewing for jobs.
2.3.1 Critics of 21st Century Skills

There is a strong pushback against emphasizing 21st century skills in education. Those who oppose it argue that it is a meaningless term and devalues the importance of teaching core content knowledge (Silva, 2009). These critics support the notion that developing a factual knowledge base in students is the foremost responsibility for teachers. Students must learn factual knowledge before creativity, problem solving, and analysis can take place (Christodoulou, 2014a). In Daisy Christodoulou’s *Seven Myths About Education*, she contends that teachers are being taught to teach in ineffective ways (2014b). She states that many of the students in Britain and the United States—especially those who eventually drop out of school—lack basic knowledge about history, geography, politics, among other subjects (Christodoulou, 2014b). In order to think deeply about a subject, students must have a foundation of factual information about that subject. To strengthen this argument, critics assert that critical thinking—a common 21st century skill—should not be viewed as a skill, but as the ability (competency) to engage in debate and discussion about a topic based on considerable knowledge (Hayes, 2014).
Critics of 21st century skills have declared a battle between teaching knowledge and skills. Both of these concepts are intertwined, with the real issue being the challenge of delivering content and skills to authentically improve the outcomes for students (Rotherham & Willingham, 2010). Nor is the purpose of teaching 21st century skills to diminish the importance of content knowledge. Rather, its essence is an emphasis on what students can do with the knowledge they have, instead of just measuring the information they have accumulated (Silva, 2009). By scaffolding the levels of Bloom’s taxonomy: knowledge, comprehension, application, analysis, synthesis, and evaluation (Anderson, Krathwohl, & Bloom, 2001), teachers can apply constructivist methods to teach content knowledge and higher-order thinking skills in relation to relevant contexts, such as jobs and careers (Vygotsky, 1980). Thus, in my research, I do not seek to diminish the importance of content knowledge, but to determine how teachers can integrate 21st century competencies into the classroom, so that the knowledge students learn will be relevant to their future. In the next section, I will identify and explore these competencies in depth to determine what experts argue is important for current and future careers.

2.3.2 Essential Career-relevant 21st Century Competencies

Policy frameworks and research literature highlight 21st century competencies (alternatively referred to as “global competencies” or “student outcomes”) as essential for students to develop in school. What exactly are these 21st century competencies that the literature suggests for students entering the workforce? These are non-routine competencies that require complex cognition and social communication abilities. It includes the capacity to solve problems, think critically, communicate with different cultures through various media, work collaboratively, adapt to change, self-manage, and learn independently (“Assessing 21st century
The National Research Council in the U.S. organizes these competencies and related ones into three categories:

- **Cognitive:** includes non-routine problem solving, critical thinking, systems thinking
- **Interpersonal:** includes complex communication, social skills, teamwork, cultural sensitivity, dealing with diversity
- **Intrapersonal:** includes self-management, time management, self-development, self-regulation, adaptability, executive functioning. (“Assessing 21st century skills,” 2011, p. 2)

The National Research Council (2012) distinguishes 21st century “competencies” from “skills” as the former term includes knowledge and skills intertwined with each other in the broader
context. There are numerous other frameworks for 21st century competencies from national and international researchers, such as C21 Canada (2012), P21 (2007), National Education Association (2010), and Fullan and Langworthy (2014). Regardless of the 21st century framework, it is evident that there are significant similarities that correspond to the three domains outlined by the National Research Council.

Forward-thinking teachers embed these competencies into every lesson and activity they administer across the curriculum. It is arguable that developing these competencies is a more complicated and holistic endeavour than learning the periodic table or memorizing facts in a history textbook. Students can learn information once and either retain it for the future or forget it after the year ends. Whereas, with competencies, students need to continuously develop them and receive instruction and support from their teachers. In a world where access to information is readily available, the importance of knowledge transmission and retention is minimized. However, the development of competencies that will benefit students in their future careers is an educational goal that teachers are starting to take seriously and recognize as essential to their profession. The National Research Council states that many employees in different industries currently lack these fundamental competencies, which are difficult to learn on the job. These are competencies that are best developed in an academic setting, before students finish high school, as they will need them for the workplace, higher education, and other aspects of their life (“Assessing 21st century skills,” 2011). It can only be beneficial to learn and develop lifelong skills at a younger age, especially in a setting where mistakes and failure are more easily accepted.

Trilling & Fadel (2009) introduce a similar set of skills that students are required to develop in the 21st century. Their research points to two skill sets that current and future
employers place at the top of their priorities to expect from potential employees. One is the ability to quickly learn and apply new knowledge. The second is having and knowing how to use these 21st century skills in any situation. These are skills such as problem solving, communication, teamwork, technology use, innovation—to name a few. To further categorize these skills, Trilling & Fadel (2009) organize them into three divisions: a) learning and innovation skills, b) information, media, and technology skills, and c) life and career skills. All of these categories could apply to the workplace, but I will examine the 21st century skills that are essential for working in new and emerging work environments. Within career skills, employers want to see all of the skills I have already mentioned evident in their employees. Nevertheless, they also evaluate performance based on criteria like flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility (Trilling & Fadel, 2009). People will continue to develop and improve their competence in these skills while working in their careers, but it is important for them to build a foundation of practice in their school years.

There is an abundance of literature and reports that identify and describe necessary skills for the 21st century. Beyond reading, writing, and arithmetic, Pearson (2014) highlights eight skills that are increasing in relevance and usefulness: leadership, digital literacy, communication, emotional intelligence, entrepreneurship, global citizenship, problem solving, and team-working. All of these skills are similar, if not reiterated, by Trilling and Fadel (2009) and the U.S. National Research Council (2011). Whereas, the Government of Canada presents some similarities, but omits certain aforementioned skills in its list of key essential skills for the workplace: reading, writing, document use, numeracy, computer use, thinking, oral communication, working with others, and continuous learning (HRSDC, 2014). Intrapersonal skills such as emotional
intelligence, self-regulation, and adaptability are not identified as essential by the Government of Canada. In addition, while this list does identify teamwork skills, it does not discuss other interpersonal skills, like global citizenship, cultural sensitivity, and dealing with diversity.

I have established a general consensus of the type of skills required for complex, knowledge-based work in the 21st century. Just knowing the most common and employable skills is not enough for teachers to implement them in the classroom. A large component of this qualitative research study is determining the effective methods teachers already use to teach career-based skills. Infusing career skills into the curriculum and teaching practical abilities is clearly more challenging than transmitting information to students. It is a major component that makes teaching a difficult profession, irreplaceable by computers and digital technologies. I have already explored how curriculum integration and making learning more meaningful to future work can be effective. In addition, teachers can apply a list of practices for 21st century learning, since teaching modern skills requires modern teaching:

1. Make it relevant.
2. Teach through the disciplines.
3. Develop thinking skills.
4. Encourage learning transfer.
5. Teach students how to learn.
6. Address misunderstandings directly.
7. Treat teamwork like an outcome.
8. Exploit technology to support learning.
Incorporating these practices into teaching is a difficult expectation of teachers, but it is necessary to support economic requirements in the 21st century. I will examine how a select few teachers and educators in Ontario use these strategies to teach career-based competencies in their classrooms. There are substantial reasons to resist this approach to teaching. Direct instruction and summative assessments of content knowledge are traditional methods that teachers and students are comfortable with, but as research has shown will not be sufficient to prepare students for entry into the workplace.

### 2.4 Integrating ICT into the Classroom

The role of Information-Communication Technologies in the 21st century classroom is increasing in prevalence and importance as educators understand its value and adjust to its influence. Technology is advancing at an exponential rate, and as I previously stated, people with ICT skills will continue to be in high demand (Mayer-Schönberger, 2013). Research published by Fullan and Langworthy (2014) highlights the strong connection between technology and educational reform. From their perspective, technology is the tool that will help teachers and students create new partnerships and unleash deeper learning, in which authentic learning tasks allow students to develop competencies, master content knowledge, and apply learning outcomes to contexts beyond the classroom (Figure 2.4). Thus, in this sense, teachers are not implementing technology in their classrooms distinctly from pedagogy or curriculum. The technology is a tool and resource working ubiquitously with the construction of knowledge and development of 21st century competencies.
There are several frameworks that can guide educators in the selection of digital tools that help students develop 21st century competencies. The Toronto District School Board (2009) outlines its ICT Standards for Students with specific connections to the Ontario curriculum, building upon the framework of the International Society for Technology in Education (2007). The TDSB and ISTE emphasize six strands important for the integration of technology in the classroom: Technology Operations and Concepts, Research and Information Fluency, Critical Thinking and Problem Solving, Communication and Collaboration, Digital Citizenship, and Creativity and Innovation. With grade-specific expectations, teachers implementing technology use in their classrooms help students develop competencies in one or more of these strands.
Furthermore, the work of Puentedura (2010) highlights four stages of technological integration for teachers to consider in their classrooms (*Figure 2.5*).

![Figure 2.5: SAMR model (Puendetura, 2010)](image)

Using these frameworks, teachers can consider if the digital tools and resources they bring into their classrooms will contribute toward deeper learning tasks that transform learning experiences, as opposed to enhancing traditional models that do not require technology.

### 2.5 Conclusion

Teachers and educators are critical players in preparing the workforce of tomorrow. In this literature review, I conclude that developing career-based skills and attitudes is a significant goal that fits into the overall purpose of education in society. By integrating the curriculum and making it more relevant to students’ lives and future careers, teachers can find greater success in
engaging their students and helping them succeed. Through building a foundation in a number of transferable skills, students will be more ready to meet the expectations of employers in the 21st century. The rising development and impact of technology, in which the dissemination of knowledge is more widespread and instant than ever before in history has changed the world in ways people earn a living. Education must reflect these changes in instructional design, curriculum planning, classroom activities, and assessment strategies. This qualitative research study examines how a select few 21st century educators have already modified their teaching strategies using the resources available to them to better prepare students for uncertain jobs and careers. I outline the methodology of this process of conducting this research, recruiting and interviewing participants, and analyzing findings in the next chapter. Thus, this will contribute to the existing research that educators who predict what their students’ world will look like in the future and adapt their teaching to meet these expectations are developing 21st century competencies in the workforce of tomorrow.
Chapter 3: Methodology

3.0 Introduction

In this chapter I outline and explain the structure of this qualitative research study. This study investigates how teachers prepare students for 21st century competencies. Firstly, I will describe the general research approach and procedures, the instruments of data collection, followed by the criteria and recruitment of the participants. I will then explain how I will analyze the data, as well as ethical considerations relevant to my study. Lastly, before concluding, I will describe the limitations and strengths of the methodology.

3.1 Research Approach and Procedures

The purpose of this research is to examine how these teachers incorporate 21st century competencies into their classrooms and engage their students in career-relevant learning. I started this process by first reviewing the literature, and then conducting semi-structured interviews with qualified teachers. The value of qualitative research, especially in relation to this study, is that it provides the opportunity for descriptive data that focuses on the process, such as teaching practices and approaches, rather than the outcomes. This data was analyzed inductively, as qualitative research does not set out to prove or disprove hypotheses (Bogdan & Biklen, 1997). Symbolic interaction, in which participants giving meaning to their experiences as essential to the experience itself, will play a strong role in this study (Bogdan & Biklen, 1997). As I stated in my research purpose and questions, the ways in which teachers understand and interpret 21st century competencies will be indispensable to discuss and analyze their experiences.

In this qualitative research study, I researched current literature on 21st century competencies and their relation to career-relevant classroom instruction. I audio recorded and
transcribed each interview, coding the transcripts according to themes present in the literature and consistent among participants’ responses. I asked all of my prepared interview questions (Appendix B) to gather information on each interviewee’s personal values and teaching practice, expanding further where necessary. The findings, which I will discuss in the next chapter, illuminates the interpretations of 21st century competencies by a small sample of teachers and provides opportunities for further research on career-relevant instruction.

3.2 Instruments of Data Collection

As I stated previously, my primary instrument of data collection are semi-structured interviews with practicing teachers. Semi-structured interviews are interviews in which the researcher is focusing on a small-to-medium sample size to gather data. During the interviews, the interviewer maintains a time limit and refers to a guide of open and close-ended questions. However, unlike structured interviews, the interviewer has some freedom to improvise, providing the participant with some ability to steer the interview (Arksey & Knight, 1999). This flexibility allows the researcher to cover the specific dimensions of their research questions, while leaving room for narratives to unfold that will offer new meanings to the topic (Galletta, 2013). The challenge of writing questions for semi-structured interviews is connecting them to the purpose of the research, while ordering them in a manner that deliberately progresses towards an in-depth exploration of the topic being studied (Galletta, 2013)

3.3 Participants

In this section, I review the sampling criteria I used to recruit participants, as well as the avenues and connections I drew on to locate these teachers. I also introduce each participant and provide some background information about them.
3.3.1 Sampling Criteria

For this study, the following criteria were used to sample research participants:

- Current elementary or secondary teachers, with at least two years of experience.
- Dedicated commitment, leadership, and/or expertise in teaching 21st century competencies, such as global awareness, cross-cultural skills, creative thinking, complex communication and collaboration, and technological adaptability.
- Familiar with the resources and pedagogy available to them through their respective school boards, such as TDSB ICT Standards.
- Participates in professional development related to 21st century competencies, such as knowledge construction through inquiry-based learning, or ICT uses for learning.
- Demonstrated commitment to engaging their students through career-relevant instruction.

These criteria were included in the participant sampling to ensure each teacher is committed to teaching 21st century competencies. They need to have been teaching full-time for a minimum of two years, so that they will have had significant experience developing their classroom and teaching philosophy. By being familiar with resources, policies, and pedagogy, as well as participating in professional development, each teacher will demonstrate a complete approach to teaching 21st century competencies that includes employers and colleagues.

3.3.2 Participant Recruitment

To locate these participants, I used a non-probability sampling technique to draw on professional relationships and connections of my associate teachers. It consisted of purposive sampling, in which I contacted educators involved with teaching 21st century competencies. These potential participants responded voluntarily based on information I provided to them. Therefore, with a small sample size of three participants recruited in this method, I have not used
statistical inference to generalize this research as representative of a larger population of teachers and classrooms (Powell, 1997).

Specifically, I attended a professional conference where I listened to speeches and participated in workshops about the potential to utilize technology in education, industry, and research. At this event, I connected in person and through Twitter with educators representing the Toronto District School Board. Additionally, two of my practicum placements were in TDSB schools, one in which I recruited a participant.

3.3.3 Participant Bios

As I previously stated, all three participants in this research study work for the Toronto District School Board. The following first names are pseudonyms to protect their anonymity. Here are brief descriptions of each participant’s qualifications and experience in relation to this research study:

-Marshall currently works as a learning coach for 13 elementary schools supporting teachers from kindergarten to grade 8. Prior to that position, he was a classroom, ICT and media literacy teacher for six years in elementary school. As a learning coach, he works one-on-one with teachers across the 13 schools, all of which the TDSB has identified as Model Schools for Inner Cities (MSIC), a program that allocates additional funds and resources to schools with high proportions of marginalized students (TDSB, 2014).

-Ted is a secondary school teacher, who during the 2015-16 school year was on secondment with the Ontario Ministry of Education. As a teacher, he has seven years of experience teaching science to students between grades 9 and 12 in both the Ontario and International Baccalaureate (IB) curricula.
Lily is an elementary school teacher, who taught grade 5 during the 2015-16 school year. She has two years of permanent, full-time experience as a classroom teacher, in which she teaches every subject except French, music, and physical education. Her school is also an IB World School, operating the IB curriculum between kindergarten and grade 6.

The three participants in this research study teach in schools located in varying demographic communities, all of which belong to the TDSB, the largest and most diverse school board in Canada.

### 3.4 Data Analysis

Following the data gathering process (semi-structured interviews), I began analyzing the data by transcribing each interview into text, reading each transcript several times, and noting ideas or key concepts in the margins (Creswell, 2013). The next step consisted of colour-coding the data into categories of information based on perspectives in the literature, or new ideas that emerged (grounded theory), to describe, classify, and interpret the data (Creswell, 2013). Saldana (2008) explains qualitative research coding in a clear and straightforward way that distinguishes between theories, themes or concepts, categories, and codes (*Figure 3.1*). I decided to use a combination of descriptive, In Vivo, and process codes (Saldana, 2008).
However, while I appreciate that In Vivo coding keeps the codes rooted in the participant’s own language, I used it minimally and only for data where I felt the participant’s words more accurately described a phenomenon compared to a descriptive or process code. After coding through multiple cycles, I organized the codes into categories that use abstraction to describe the phenomenon consistent among a group of codes. Categorization lead to the development of themes, which are specific to my research questions and the commonalities amongst all of my participants. Themes refer to abstract constructs that link expressions and ideas found within the data (Ryan & Bernard, 2003). The themes I identified in this research study are:

1. Teacher perspectives on the meaning of 21st century teaching and learning

2. Participants’ integration of ICT as a valuable resource to help students develop 21st century competencies
3. Participants identified curriculum resources and professional development opportunities that helped to integrate ICT and 21st century competencies in their teaching practices.

4. Challenges integrating ICT and 21st century competencies identified by participants: barriers and possible solutions.

5. Perspectives of teachers preparing students for highly-skilled careers.

### 3.5 Ethical Review Procedures

All participants in this research study were given a letter of consent, which they were required to read and sign prior to the interview (Appendix A). The letter of consent provided each participant with a written document outlining the process, purpose, and confidentiality of this research study. Each participant received a copy of the letter, and another was retained for the records of this study.

There are no known risks to participation in this study. Nevertheless, I made every effort to make sure each participant was willing and comfortable participating in this research study. This included explaining the research topic and purpose to them, and reviewing it at the beginning of each interview. I informed participants that they could refrain from answering any of the questions, as well as review or change their responses at any point during the research process. Participants could withdraw from the research study at any point prior to publication. Interviews were conducted in-person and audio recorded to allow for accurate transcription, which I shared with each interviewee.

I conducted all procedures as specified in the consent forms signed by each participant, without making any changes throughout the process of this qualitative research study. Pseudonyms were used to mask the identity of each participant for confidentiality purposes. This includes placeholders for individual-specific information, such as school names, to protect
anonymity. These measures were taken to protect each participant’s confidentiality, as personal opinions could conflict with the interests and policies of employers and ministries. Audio recordings and transcript data will be stored on a password-protected computer for up to five years after it has been collected. I carefully reviewed the data and adhered to procedures to ensure participants are protected from personal or professional conflicts. All participants were made aware of, and consented to, my course instructors’ role in the research process, which included reviewing all of the data.

3.6 Methodological Limitations & Strengths

The limitations of this qualitative research study are that the Master of Teaching program restricts the data collection to interviewing three educators. This small sample size and strict parameters prevented me from formally interviewing students and parents, who could have provided their perspectives and interpretations of 21st century competencies. In addition, this study limited me to semi-structured interviews conducted one-on-one with participants, and no observations were permitted. I could not conduct group interviews to simultaneously gather opinions from multiple educators. Thus, with such as small sample size, it is difficult to generalize or extend the findings to represent broader populations. Due to these limitations, I chose to focus solely on teacher perspectives, omitting the firsthand opinions of administrators and policymakers. However, this is a possibility for further research on this topic.

The strengths inherent in this qualitative method revolve around the quality and depth of semi-structured interviews. Through this approach, I can document and analyze the experiences of individual teachers as they interpret and teach 21st century competencies. This method prevents generalizations on the topic, instead identifying the strengths and weaknesses of each teacher’s practice. By selecting and presenting these voices, I can explore contemporary teaching
21ST CENTURY COMPETENCIES AND ICT INTEGRATION IN THE CLASSROOM

approaches that prepare students for work and life after graduation. Any barriers or challenges present in these approaches highlights areas for further research and development.

3.7 Conclusion

This qualitative research study consists of three semi-structured interviews with practicing teachers to gain their perspective and interpretation of 21st century competencies. Through this research method, I have documented, presented, and discussed the teaching strategies of three educators who play a strong role in preparing their students for future careers, as it relates to the literature. I located these participants by attending conferences and receiving recommendations from colleagues. Each participant fit the criteria for this study and confirmed their willingness to participate by signing a letter of consent. In the following chapter, I will present the relevant findings from these interviews that relate to 21st century competencies, ICT integration, and career-relevant instruction.
Chapter 4: Findings

4.0 Introduction

In this chapter I report and discuss the findings from three semi-structured interviews with three educators, Marshall, Ted, and Lily, in the Toronto District School Board. Through these interviews, I explore and analyze the perspectives of these educators as they present their understanding of “21st century” teaching and learning and explain how they implement it in their classrooms. I have organized the data into five themes relating to the following areas that are integral to the development of 21st century competencies: participant perspectives on the meaning of 21st century teaching and learning, integrating information and communication technologies (ICT) into the classroom, curriculum resources and professional development, challenges these educators encountered, and their perspectives preparing students for careers. By integrating and analyzing participant voices, this chapter provides a response to my research questions examining how these educators understand and implement “21st century” teaching and learning. I report and synthesize each participant’s opinion of the relevant 21st century competencies and the value of ICT in today’s schools.

4.1 Teacher perspectives on the meaning of 21st century teaching and learning

Throughout the data gathering process, participants in this study presented their perspectives of 21st century learning, drawing attention to internal and external influences. I identified three sub-themes within these findings: developing personal definitions of changing 21st century competencies by building on existing frameworks; specific competencies participants identified that were relevant to their students during this research study; and preparing students to be competent global citizens.
4.1.1 Developing personal definitions of changing 21st century competencies by building on existing frameworks

Participants highlighted the frameworks that are currently available to teachers from various organizations, school boards, and educational researchers, which they draw upon to develop their own personal definitions. Specific frameworks that arose during the interviews are C21 Canada (2012), TDSB ICT Standards (2009), ISTE Standards for Students (2007), and Fullan and Langworthy (2014). Ted emphasized the six C’s in literature published by Michael Fullan as his preferred framework, but noted that competencies are dynamic and their relevance changes, so he advises teachers to select any framework grounded in problem solving and inquiry. A challenge for teachers is defining 21st century competencies, because it is a broad term and there are numerous definitions in the literature. Ted, acknowledging the difficulty of defining the term, summarized his definition of 21st century competencies: “It’s new types of skills that (students) require for problem solving and to be able to come up with creative solutions to problems that haven’t been solved yet.” This definition puts students first as the drivers of their own learning, engaging with the curriculum to solve real-world problems. It gives purpose and relevance to the instruction and assessments in the classroom by connecting it to issues they will encounter outside school, especially in work environments.

4.1.2 Specific competencies participants identified that were relevant to their students during this research study

Throughout the course of the data gathering process, specific competencies currently relevant to students in the 21st century became prominent from each of the participants’ voices. The most common of these were communication, critical thinking, problem solving, collaboration, and creativity, which is not surprising and align with competencies and skills

Participants explicitly identified these competencies, as well as implicitly alluded to them through the lessons and units they described.

Lily also brought attention to the importance of students developing 21st century competencies early:

I have kids in my class right now that are really struggling to collaborate. We do a lot of that, and we’re doing a lot of it with robotics and it’s frustrating for them, because they all have ideas and they all want to have a say, and if they don’t know how to work together nothing gets done. So they’re learning that the hard way a little bit now, but it’s good to learn now rather than when they’re working in an office or going out and trying to solve a problem somewhere else.

Here, Lily recognized that school is an opportunity for students to develop competencies, make mistakes, and problem solve in an environment that for her is more forgiving than a workplace or another venue. Within the current societal structure in Canada, school is the place Lily’s students spend a great deal of time, and it is the best environment to develop as global citizens, career-ready individuals, and students who will be prepared to pursue higher education.

4.1.3 Preparing students to be competent global citizens

Global citizenship from the perspective of this research study and its participants refers to the ability for students to develop 21st century competencies as citizens of a changing, technology-infused world. Just as the world and the technology running it are constantly changing, Ted recognized that the skills and knowledge relevant to students are also changing: “I think the 21st century competencies are going to be like that too, where they’re going to be a
constant evolution of where society is going and what’s useful.” In this sense, the competencies that are relevant for the workplace and postsecondary education are constantly shifting. Participants highlighted the importance of competencies that go beyond academia or the workplace, demonstrating a global and altruistic approach to education. Through the International Baccalaureate (IB) program, Ted and Lily focus on character traits to develop collaborative, open-minded, inquisitive, and reflective students using global themes that link to the Ontario curriculum. These character traits reflect the global competencies outlined in the National Education Association (2010) policy brief. The goal is to develop students who are internationally minded and aware of global issues, with a respect for cultural diversity, and the ability to function in an interdependent community.

Lily—a self-described environmental educator—incorporates an aspect of civic responsibility into her teaching practice. Her First Lego League project has a civic responsibility component to it, since students have to work together to find solutions to real problems with trash collection and processing. Furthermore, she also described an EcoSpark program she has implemented called Changing Currents. She took her class to the local ravine to collect data on benthic macro-invertebrates, which are small water bugs that act as indicators of water quality:

The kids were in hip waders doing that science, actually getting to do a job that people do all over the country. And having an impact because the data that they collected would then go on to be used to determine how—whether it’s clean or whether it isn’t and what can be done next.

By providing students with the opportunity to experience a real job and help out their local community, Lily’s project-based learning not only helps them achieve curriculum expectations—habitats and communities in grade 4 science (Ontario Ministry of Education, 2007)—but helps
them develop career-relevant skills and global competencies. They collaborated, problem solved, and communicated their findings to act as citizens with a sense of civic responsibility. Lily’s students are affecting change on a local level, which coincides with Noddings (2005), who holds that teaching principles of global citizenship is rooted within the context of the local community. This is an area of literature I did not cover in detail in this study, however it presents opportunities for further research. In the following theme, I will highlight how these educators integrated ICT into their teaching practices, including examples of their students using technology to make an impact beyond the classroom.

4.2 Participants’ integration of ICT as a valuable resource to help students develop 21st century competencies

As I have identified the 21st century competencies in the literature and highlighted by the participants during the data gathering process, as well as the changing nature of those competencies in relation to students, a key theme related to this is the technological tools teachers implement in their classrooms and the level of student engagement with those tools. Within this context, I identified three sub-themes for integrating ICT: technology as a dynamic tool; student engagement with 21st century ICT; and the mobilization of knowledge using ICT.

4.2.1 Technology as a dynamic tool to engage students in the learning process

Using technology as a learning tool to engage students is a finding consistent amongst the participants in this study. Lily distinguished between integrating technology and developing skills: “I don’t think of 21st century learning skills as integrating technology. I think it’s important and that’s a part of it, but it’s a tool to get to get to the skills.” Recognizing this distinction shows that she is intentional and thoughtful when selecting ICT to bring into her
classroom, so that students can use higher-order thinking skills (Churches, 2009; ISTE Standards for Students, 2007; TDSB ICT Standards, 2009) and interact with the technology in more meaningful ways to transform knowledge. As Fullan and Langworthy (2014) contend, technology integrated with new pedagogies will be the tool that unleashes deep learning. In this method, students are in control of their learning, collaborating to discover and use knowledge for authentic purposes.

Technology is constantly changing and exists as a dynamic resource in schools, workplaces, and other institutions. Ted cautioned against building a classroom environment where technology and instruction is mutually exclusive:

And I found that in school myself, those were always the extras that weren’t really included in the school. So I found that we’d be doing something, like I remember grade four we were doing HyperStudio and programming a game that would do something, and then it would be the cool teacher that would let us stay after school to do that kind of thing.

Participants highlighted that technology and pedagogy are interconnected when used to develop 21st century competencies. As a result, when they incorporate a specific ICT into their teaching practice, it is not the focal point of the learning outcomes nor is it an add-on to the learning process. Students are using ICT as a tool to construct knowledge, develop skills, and demonstrate their understanding.

The potential for teachers to use technology as an assessment tool for students to demonstrate their understanding and activate their competencies stands out in the findings from the interviews. Ted emphasized that teachers who have the ICT resources available to them can reframe how they assess and evaluate students. For example, if a teacher has access to a
SMARTboard, rather than use it in the same ways they would use a chalkboard, they can have students make use of its interactive features for formative and summative assessments. Marshall described a project he implemented with teachers in grades one and two: they used Explain Everything, an interactive whiteboard app on the iPad, to create mixed-media responses to literature. During the process, these teachers used learning goals and success criteria to monitor student progress and facilitate opportunities to succeed in the task. The technology, when used as a learning and assessment tool, is integrated into the classroom along with strong pedagogy and student-centred practices. Therefore, it is the modern pedagogical teaching methods that give the technology purpose as a tool in which students are more than passive consumers of content.

4.2.2 21st century ICT: from students as passive consumers to active creators of content

Participants referenced the various levels of interacting with ICT, specifically Marshall noted the SAMR model in which there are four levels of technological interaction: substitution, augmentation, modification, and redefinition (Puantedura, 2010). Marshall described it as a continuum, in which the most basic level (substitution) could be a student using Microsoft Word to type a worksheet they could complete using pencil and paper. For him, the challenge is to integrate technology while preparing students for future roles and engaging them with personal interests. Ted viewed this as understanding the shift from being content consumers to content curators to content creators. He used an example of the transition from watching YouTube videos, to curating them into playlists, and finally having students be the ones creating them and producing the knowledge. In Lily’s class, she used Minecraft as an ICT platform to engage students and provide them with the opportunity to create content and connect to the curriculum. The examples and perspectives of the participants represent what Fullan and Langworthy (2014) describe as higher level uses of technology, in which it is used for creativity, collaboration, and
knowledge creation, rather than layering ICT on top of traditional teaching. Students of the participants in this research study interacted with technology in a deeper manner beyond the superficial realms of consumption or substitution. Participants recognized that technology is an integral tool to the development of 21st century competencies, since it is embedded within every aspect of society. As these students interact with technology in authentic ways, these educators provide them with the opportunity to make an impact beyond their classrooms.

4.2.3 Mobilizing knowledge using ICT to make an impact beyond the classroom

Using technology, participants explained how students use knowledge and solutions to real-world problems to affect change beyond the walls of their classrooms. Ted described a project in which his students researched and compared the environmental impact of real and artificial Christmas trees. Students used YouTube and other social media to communicate their findings, and through this medium they received responses from the general public, who were surprised that buying an artificial tree could have a worse impact on the environment than cutting down a real tree. Since the students found that the public had negative associations with cutting down trees, they were able to change people’s perceptions to reconsider the plastic, packaging, shipping, and other environmental impacts of artificial trees. Through this example, Ted demonstrated the ability for students to connect their learning to issues beyond the classroom and actually make a difference of some significance. Thus, participants recognized communication, specifically to broader audiences and the general public, as an importance competency for students to develop in school.

Participants also highlighted the importance of students communicating to specific audiences, such as government and industry. For example, in Lily’s class students wrote letters to their city councillor for the Changing Currents project to communicate their water quality
findings in the local ravine. Ted described a similar approach in his classroom, however his students used social media to communicate to various audiences: “So we would tweet like to Loblaws about their bag policy and we would get an instant answer, instead of writing a letter that takes so long it doesn’t come back until the course is done.” By using technology, specifically social media, to communicate to an audience beyond the classroom, students could mobilize their knowledge efficiently to make an impact in a timeframe relative to their interest level. With this approach, students can find purpose in the course content, because it relates to issues in the real world, which increases motivation and achievement (Hargreaves & Moore, 2000; Orthner, Jones-Sanpei & Rose, 2013). As a qualitative researcher, I am concerned about the impacts of my own research and the methods that I will use to communicate it to a broader audience. I recognize that ICT is an integral tool to help me learn and continue developing competencies, which includes communication in the 21st century. For these teachers and a teacher-researcher like myself, curriculum resources and professional development help to integrate ICT into the classroom.

4.3 Participants identified curriculum resources and professional development opportunities that helped to integrate ICT and 21st century competencies in their teaching practices

Resources are integral to any classroom and school environment, regardless of teaching methods and pedagogies. Therefore, to implement 21st century teaching and learning the participants in this study identified curriculum resources that they draw on for their classrooms. These included the abundance of information and literature, innovative learning programs, learning coaches, and social media. In addition, opportunities for professional development supported these educators in their careers. In this theme, I report the findings through two sub-
themes that relate to the curriculum resources and professional development the participants
drew upon to integrate ICT and 21st century competencies.

4.3.1 Curriculum resources for 21st century teaching and learning

When considering resources to help integrate ICT and 21st century learning in the
classroom, participants stressed the importance of finding resources that connect to the
curriculum, since they believe that teachers use the curriculum as a rigid framework directing
their job. Ted emphasized the importance of resources that connect to specific subject areas (and
grade levels) in the Ontario curriculum, which for him is science. Lily also reinforced this point
that curriculum supports are valuable, however not all educational documents connect to
curriculum and that is not always an indicator of usefulness. Within the context of literature to
help communicate and think critically about the health curriculum, she used the example of
Supporting Minds: An Educator’s Guide to Promoting Students’ Mental Health and Well-being,
an Ontario Ministry of Education (2013) document that can help educators to prevent, recognize,
and respond to mental health challenges. While Lily highlighted the value of such documents,
she stated that it does not always connect to the curriculum, which teachers are “mandated to
do.” Participants also mentioned creativity and exploration as qualities consistent among teachers
willing to integrate 21st century competencies. Finding invaluable literature and supports—
regardless of immediate curriculum connections—and using them to make the curriculum more
engaging for students is a strategy each participant implements. This not a new approach to
teaching, as Hargreaves & Moore (2000) describe Ontario teachers using cross-curricular
instruction to make connections to the curriculum that are relevant to students’ lives.
Lily discussed access to learning coaches and innovative programs as important resources she uses in her teaching. She piloted a First Lego League (FLL) project in her class in which students worked in teams to design, build, and program a robot, as well as researched solutions to garbage processing, and developed core values. Through this project, Lily’s students developed critical thinking, problem solving, collaboration, and communication skills. Lily demonstrated a willingness to search for curriculum resources and experiment with different projects in her classroom. Ted used Twitter as an important platform to find ideas, network with other educators, and collect resources. Nevertheless, there is an abundance of information and curriculum supports available online, through school boards, the Ministry, and other sources, so he advises that new teachers find ideas that interest them and modify them to suit their needs and personal style. Thus, participants indicated areas they draw upon to find curriculum resources, providing examples of the supports and programs they brought into their classrooms.

4.3.2 Professional development opportunities and a willingness to grow as a teacher

In direct contrast to the prevalence of traditional teaching, participants demonstrated a professional engagement and willingness to explore new pedagogies and resources. Marshall stated that his role as a learning coach exists to help teachers make connections to new pedagogy, ICT, and other resources, but they have to be willing to try new things and believe in the benefits of modern teaching practices. For those teachers who are willing to explore and implement new teaching strategies in their classrooms, participants identified numerous opportunities for professional development. From conferences, workshops, and courses, there are many opportunities for teachers both in-person and online. Ted highlighted a couple of conferences—Bring IT Together by the Educational Computing Organization of Ontario (ECOO) and CONNECT—as significant for educators in Southern Ontario who are committed
to learning more about 21st century competencies and ICT. As long as the teacher is open to exploration and professional growth, participants ensured that professional development is available throughout the school year and summer. The quality and learning outcomes of the professional development varies, depending on the knowledge and experience of the individual. For Ted, who considers himself “ahead of the curve,” there is a lack of level-appropriate PD that is challenging and engaging for him. For a teacher in his position, he ends up leading sessions and presenting his teaching practices to other educators. This indicates an inconsistency of experiences and teaching strategies, but also demonstrates that there are teachers who are willing to learn and develop as professionals, embracing new pedagogies and the potential to engage students using ICT. Among those teachers who have this quality, there are aforementioned opportunities to learn about new strategies and technologies, though there are numerous challenges to implementing them in their schools.

4.4 Challenges integrating ICT and 21st century competencies as identified by participants: barriers and possible solutions

As is clear throughout this research topic, ICT is a fundamental component of 21st century learning and the development of related competencies. Using technology as a learning tool to engage students and bring research-based pedagogies into the classroom is a theme consistent among the participants. However, to have the option of bringing technology and progressive pedagogies into a teaching program, teachers need to have access to the necessary tools in their schools. Participants identified numerous barriers to accessing ICT and helping their students develop 21st century competencies, which I explain through five sub-themes: accessing and getting funding for ICT; inconsistency of pedagogical methods; professional
relationships with colleagues; teacher experience and competency with ICT; and an official Ontario Ministry of Education policy for integrating ICT and 21st century competencies.

4.4.1 Difficulties, teacher resourcefulness, and inequitable access to ICT and funding

Accessing ICT and gaining funding for ICT is a potential barrier that the participants indicated during the interviews. Ted recognized the importance and value of ICT, but highlighted its varying availability in schools:

I think the problem is also that a lot of the 21 C, you can still do a lot of it without tech, but I think a large part of it relies on the technology itself, but then also the infrastructure. So I went from a school that had everything to one-on-one laptops, Wi-Fi, and then I went to another school that had nothing.

Ted illuminated the inequities within a large and diverse school board like the TDSB that pose a barrier for teachers who want to integrate ICT into their practice. Despite these inequities, the Ontario Ministry of Education (2014) is committed to equipping students for a technology-infused world. Investment and funding for ICT resources can come from multiple directions, including top-down sources like the Ministry of Education or school boards, external organizations, and fundraising, in which access to these sources varies in different schools.

Despite inequitable access to ICT and funding, these educators demonstrated resourcefulness to increase opportunities for their students to develop 21st century competencies. Lily hopes that funding will increase as the Ontario Ministry of Education further prioritizes ICT, but also took the initiative to approach external organizations, such as EcoSpark—a not-for-profit that works with schools to help them monitor the environment and affect positive change (EcoSpark, 2014). In certain instances, teachers are taking the initiative to seek funding for
resources and access to ICT in their classrooms. Lily hinted at the amount of money needed for ICT resources: “This all costs a lot of money. I won’t tell you the amount of money of equipment that’s in my room right now.” Teacher resourcefulness to seek external funding can help with accessing ICT, however the inequities across schools continue to remain.

Lily teaches in an affluent community with the capacity to fundraise for resources. However, not all schools have the same capacity, as there are socioeconomic inequities that exist within the TDSB and other school boards. As Marshall points out, the TDSB recognizes these inequities through programs like Model Schools for Inner Cities (MSIC). Through this program, the TDSB allocates additional funds and resources for schools identified as serving a large number of underprivileged students. According to Marshall, the resources include program resources, equipment and hardware, as well as human resources, to create equitable access for students whose families have lower household incomes and parents without postsecondary education. MSIC helps to close the gap between equitable access to resources, including ICT resources, however as the participants indicated the barriers still exist and present a challenge for educators to teach using ICT to help their students develop 21st century competencies.

4.4.2 Inconsistency of pedagogical methods in participants’ schools

During the interviews, participants described a phenomenon they perceived that colleagues within their schools and school board continue to teach students using traditional pedagogies, such as rote learning, drill-based worksheets, and lecturing. Based on personal experience, Ted described this phenomenon of systemic teaching: “It’s just kind of teach them how you’ve been taught when you took that, so whether you learnt math this way and then you’re the math teacher, now you’re teaching math that way.” While the students of these types of
teachers may still be learning the content knowledge expected of them in the curriculum, these teachers may not be helping their students develop 21st century competencies as described in this research study, nor are they connecting to career-relevant instruction when they focus on content alone. This is in direct contrast to the exemplar teaching practices of Ontario teachers outlined by Hargreaves and Moore (2000).

When examining the factors that may cause traditional teaching methods to remain prevalent in TDSB schools, participants highlighted a lack of official policy from the Ministry of Education (see 4.4.5). Another factor that the participants viewed as contributing to this phenomenon is the reliance on textbooks to deliver curriculum content. Ted finds that as a resource textbooks are hindering teachers and students more than helping them: “…some teachers use that as their teaching tool, and then end up going through ‘okay page 1 to page 300, and we’re doing it in the order the textbook says,’ and I find that it acts as a crutch.” In his opinion, relying on textbooks too heavily focuses mainly on the knowledge category of the Ontario achievement chart, while neglecting to prepare students to think critically about 21st century problems. It is clear that in the participants’ experience there is a negative correlation between a reliance on textbooks and the development of 21st century competencies through real-world connections.

Participants would not generalize the prevalence of teachers using traditional pedagogies compared with the prevalence of modern approaches, however they did state that there is inconsistency within the TDSB—the largest school board in Canada—that acts as a barrier for teachers and students. Marshall, who gets to interact with teachers across the board, described it as “pockets of innovation” happening, with the remaining teachers not at a point where they are helping their students develop 21st century competencies. Whereas, Ted depicted a common
occurrence in which students experience gaps in teaching styles. Based on these gaps, students experience innovative and engaging teaching during certain grades and traditional teaching in others. There is a clear phenomenon that the participants in this study, who demonstrate qualities of a modern teacher outlined by Hargreaves and Moore (2000) and Fullan and Langworthy (2014), perceived a spectrum of teaching strategies in their schools and school board. They could not pinpoint direct causes for these variations, notwithstanding the fact that teachers bring a multitude of inner and outer experiences to the profession (Palmer, 1997).

As a result of these experiences, there is a question as to whether the age of the teacher has a correlation to their teaching method and willingness to integrate ICT and 21st century competencies. Marshall described a category of teachers who are close to retirement and refuse to change the teaching methods they have been using for decades, but acknowledges that not all teachers think selfishly. One of the teachers he worked with could retire, but saw the benefit of integrating iPads into her grade one program: “…it’s opened up her eyes to this possibility…to professionally explore it would feel like there’s so many avenues now that have made her want to continue teaching and not retire.” From this perspective, Marshall does not see age alone as a determining factor in sustaining traditional teaching methods. Lily reinforced this viewpoint from what she witnessed in her school: “I’m a young teacher, I have a lot of buy-in, because I see that these skills are applicable, and I know there’s a lot of older teachers at our school who also have a lot of buy-in because they see the skills are applicable.” The age of the teacher and relationship to retirement were not consistent factors determining the pedagogical decision-making for the participants in this study. The prevalence of outdated teaching methods is a challenge for educators who want to integrate ICT and 21st century competencies, especially since teaching is a collegial profession.
4.4.3 Participants’ professional relationships with colleagues

Participants highlighted the value and challenges of developing professional relationships, especially for new teachers who are open to learning new strategies and discovering new resources. Developing a professional relationship with a colleague committed to integrating ICT and 21st century competencies can be difficult. Marshall’s advice for new teachers is to find an experienced teacher within the same school who can act as a mentor and guide for the various technology, STEM, and 21st century frameworks. However, he cautions against becoming a carbon copy of another teacher’s style and lesson design: “I think you’re just perpetuating the same thing that has been done and done again.” This shows that teachers, especially new teachers, have to use their professional judgement when accepting advice and resources from other teachers. They can recognize that it is coming from a teacher who wants to help and support them, but they must be careful to avoid sustaining the traditional and systemic teaching that fails to help students develop 21st century competencies. Ted and Lily also reinforced the importance of professional relationships and professional learning communities (PLC). Ted emphasized that he continuously looks for colleagues who are “allies” that share similar interests, but it can sometimes be challenging to achieve this in certain schools. If he cannot find any of these teachers within his school, he uses Twitter to develop an online network of professionals. Lily presented a similar perspective, as she used to be part of a PLC in a different school board that conferenced online using Facebook, Twitter, and FirstClass, but also collaborated in-person at workshops. Thus, participants noted the potential difficulties of building professional relationships and communities, but emphasized the value as a resource and support for developing 21st century teaching strategies. They stressed the belief that teaching is a collaborative profession, which includes sharing ideas and resources with colleagues.
4.4.4 Participants’ experience and competency using ICT

A key finding across the participants for a teacher’s ability to integrate ICT and 21st century competencies was the benefit of having experience, competency, and a strong comfort level with ICT, however each of the participants' individual passion for new technologies varied. With a self-professed background and strong comfort level with ICT, Marshall believes it helped him to connect with the pedagogy, using the technology as a tool as outlined in 4.2.1. As a result of his experience and comfort level, as well as an openness to being flexible and adaptable to different technologies, Marshall demonstrated an advantage as a teacher for embracing new pedagogies and developing 21st century competencies. It is this flexibility and adaptability that appeared to give him and the other participants that advantage and places them in a category representing strong examples of 21st century teaching. Lily highlighted this flexibility, but did not understate the challenges of facilitating a new ICT with a classrooms of students, regardless of personal competency:

I won't tell you the stress I am under because of this robotics program. Just having like 29 kids with robots and computers everywhere, it’s a lot, but it's—I mean stuff like this if you want to integrate this kind of stuff in your classroom, it's going to be messy. It's not going to be sitting kids at a desk with worksheets. It's going to be lots of yelling and noise and you just have to become comfortable with that.

Here, Lily exemplified the perspective of a teacher who is willing to embrace some chaos as a learning opportunity for everyone involved in the classroom. Accepting that the process is imperfect demonstrated that she values it to help students develop competencies such as collaboration, communication, and problem solving. And by understanding and responding to the
challenges, such as experiencing technical difficulties, she modelled certain competencies outlined by Trilling and Fadel (2009) when she solved problems and adapted to setbacks.

The individual passion for discovering and implementing new technologies varied among the participants. Marshall and Ted both professed a strong passion for ICT from a young age, while Lily did not consider herself to have a passion for new technologies: “My actual personal opinions about screen time are that we get way too much of it…but I think technology is a tool and I believe it’s a tool and can be used as a tool in positive ways.” Regardless of their individual passions for technology, the participants demonstrated that they recognize its importance as a tool and are willing to implement it in their classrooms using appropriate pedagogy. Therefore, Lily proved that being dispassionate about technology is not necessarily a disadvantage as long as the teacher is comfortable and competent. I cannot extrapolate these findings to represent all teachers, but from the viewpoint of these three educators’ experience, comfort level, and competency using technology it is a benefit for helping students develop 21st century competencies, and that passion did not correlate as long as they compensated with professional motivation.

4.4.5 Ontario Ministry of Education’s lack of official policy for integrating ICT and 21st century competencies

(The next chapter includes an update on this finding, specifically a draft document for 21st century competencies in Ontario). 21st century teaching and learning, which includes 21st century competencies, is a popular concept in current educational discourse that can be vague and inaccessible for teachers. Participants in this research study emphasized the need for direction and an official policy from the Ontario Ministry of Education to help guide Ontario’s teachers in understanding and helping students develop these competencies. Marshall
continuously reiterated that the Ministry does not currently have an official document for integrating technology and 21st century competencies into the classroom. Ted did not dispute this point, but stated his knowledge of a 21st century learning department at the Ministry that is currently developing an official policy. Whereas, Lily was uncertain of the existence of an official policy, because as a teacher she encounters numerous resources and cannot recall all of them. At the end of 2015, I could not find an official policy on the Ministry website, which I expected based on the participant findings. However, as Ted indicated, there is evidence to show that the Ministry is developing policies and demonstrates a commitment to 21st century competencies. Documents and resources such as Achieving Excellence (2014), 21st Century Teaching and Learning (2014), and the Capacity Building Series (2007-2015) are examples of the Ontario government’s recognition and progress in this area. Nevertheless, participants stressed the need for an official policy and framework to mandate teachers to adapt their teaching strategies for 21st century competencies. The participants’ opinions of the need for an official policy demonstrated that they believe the majority of teachers are motivated and directed by the fundamental requirements of their profession, which they viewed as teaching the curriculum. Through the teaching of curriculum by integrating ICT and 21st century competencies, a final theme I found in this research project concerns the relationship between schooling and student preparation for in-demand careers.

4.5 Perspectives of teachers preparing students for highly-skilled careers

21st century teaching and learning involves preparing students for life in a technology-infused, media-intensive, and globalized world. Part of this research exploring how teachers understand this and help their students develop 21st century competencies involves their perspectives of the teaching profession in preparing students for careers. This theme focuses on
the purposes of education as social initiation and personal development for students during their enrolment in publicly-funded institutions. I examine this data through four sub-themes: the teaching profession’s relation to student career paths; career-relevant instruction; preparing students for postsecondary education; and helping students explore personal interests.

4.5.1 Positionality of the teaching profession in relation to students’ future career decisions

Participants in this research study expressed their unique positions as teachers in being able to influence the eventual career decisions by students. Understanding 21st century teaching and learning involved this aspect of the teaching profession, though it is not all-encompassing. Lily viewed this as her main role, even as a grade five teacher, because of the way society functions:

I wish they could all do things they are absolutely, insanely passionate about, but at the end of the day not all of them will. Some of them will. But I feel like our role is to be able to prepare them for real life, and real life means a job. I mean it also means living, and I think frankly all of these 21st century learning skills are applicable outside of a work environment as well, they’re just what it means to be a good citizen.

Even by helping students develop career-relevant skills that apply to various fields, Lily recognized that these skills intersect with citizenship and social responsibility. Pursuing interests and finding a passion in life is not exclusive of career preparation. On a whole, Lily understands that careers are important, but are not necessarily the end product of education, as outlined by Campbell (2008). Her placement of career preparation as an integral role for teachers coincides with Herr (1987), however this approach is distinct from vocational education that prepares students for specific careers. Through the impact of 21st century competencies, students are taught to participate in society and critically analyze the nature of work (Kincheloe, 1999;
Rojewski, 2002). Thus, 21st century teaching and learning transcends specific careers and working as a whole. The Ontario Ministry of Education (2014) reiterates this commitment to help students excel and create new jobs in the future, but the accountability of the teachers remains in question.

4.5.2 Career-relevant instruction

A significant focus of this research study is the methods in which educators prepare students for current and future careers. Marshall conceptualized 21st century competencies to include preparing students for careers and mirroring the classroom with the working world. Participants demonstrated an understanding of current career trends in Canada and the shift toward higher-level skilled jobs. Ted presented his perspective on the careers for which he prepares his students:

I think that a lot of the newer jobs, it seems that they’re going towards higher-end jobs. Jobs that can’t be replaced by someone either being paid a lower wage in a third world country or something that cannot be replaced by a machine…. I think in Canada you really have to be pushing higher education and innovation, and I think that’s where a lot of the careers will be in science, innovation, technology, and a lot of stuff with entrepreneurship.

Human Resources and Skills Development Canada (2011) reinforces these career trends towards high-skilled positions. These higher-level skilled jobs refer to jobs that require expert thinking and complex communication (Trilling & Fadel, 2009). By recognizing these trends, participants placed a higher emphasis on inquiry and collaborative problem solving, with rote learning, memorization, and repetitive tasks taking a lower priority for their teaching practices. Furthermore, Ted indicated a trend toward entrepreneurship, which converges with the rise in
start-up activity in Canada (Tal, 2012). However, as I stated in the literature, half of all start-ups in Canada fail within five years, which is why Ted tentatively considers the risks and benefits of entrepreneurship, since it places the accountability entirely on the individual. With that in mind, Ryerson University’s Digital Media Zone (DMZ) and the University of Waterloo present appealing opportunities for students to build their own companies while completing postsecondary degrees.

Pompa (2015) emphasizes science and technology-related sectors as fields that will continue to expand and provide the highest number of jobs in the coming decades. As a result of these trends, participants focused on STEM (science, technology, engineering, and mathematics) careers when considering career-relevant competencies. Lily recognized how the First Lego League project can help prepare students for careers, because she perceives careers trending towards science and engineering. However, she also recognized that iteration and problem solving are important in any field. As a result, she underscored the importance of students “having a sense of creative problem solving, being able to come up with solutions, but not inside the box solutions, to really stretch their brains and come up with many, many, many obscure ways to solve a problem.” From her prior experience working in business and communications, she values these skills highly. Therefore, while participants focused their teaching and examples on STEM-related areas, they also recognized that many career-relevant 21st century competencies are applicable across disciplines and provide students with the opportunity to succeed in any chosen field.

4.5.3 Preparing students for career-focused postsecondary education

Participants in this study emphasized the importance of teachers’ role in preparing students for postsecondary education. Integrating ICT and helping students develop 21st century
competencies became necessary to prepare students for highly-skilled jobs and educational programs that correspond with these jobs. Participants valued universities and colleges as places for students to gain deeper knowledge, improve skills, and increase opportunities for employment. A challenge they encountered in preparing students for postsecondary education is that they find teachers are unaware of some of the specialized programs available to students. As a result, they find that students and parents are also uninformed about some of these programs. While they did not specify examples of programs, Marshall and Ted indicated the need to prepare students for new programs with strong connections to various industries. Ted believes that “industry consults really well with university and colleges saying ‘now we have a specialized program in whatever, whatever’ and then those are brand new programs that are just being created as a need that's required.” The occupations which report labour shortages due to skills gaps are commonly in STEM fields (HRDSC, 2013), which would represent many of the new and relevant programs alluded to by Ted. Thus, if teachers seek to reduce the skills gap in Canada, they need to identify and recognize the skills that students can apply in career-focused postsecondary education. The Canadian Chamber of Commerce (2014) identifies these as literacy, numeracy, technological literacy, and problem solving. Regardless of the exact skills each educator focuses on, Marshall emphasized that they are all interconnected and the need is to prepare students for the world around them.

4.5.4 Empowering students to explore and develop interests that could lead to future careers

The impact of student-centred learning that empowers students to explore personal interests through the integration of ICT and 21st century competencies was a significant finding. All three participants emphasized student engagement as an important outcome in their teaching
practices. Ted highlighted the potential for schools and teachers to engage students through inquiry:

“…school should be a time for play, experimentation, inquiry, find out what they really like, what they’re really interested in, what drives them. And then further to connect them to what the next step will be, whether it be workplace, postsecondary, either college or university”

And despite all of the challenges I outlined previously for teachers, Lily prioritized student engagement as the reason she chooses to persevere through the difficulties. She described her perspective of how students in her class responded to projects that are creative, technology-infused, and relevant to careers: “Oh they love them. They love them so much. It’s so funny, well because that’s what keep me doing it, right? When I see the engagement, that’s what motivates me.” Creating relevant, purposeful experiences for students, in which they can see the connections beyond the classroom resulted in engaged students for Lily’s class, and is a significant outcome of learning in any classroom (Woolley, Rose, Orthner, Akos, & Jones-Sansei, 2013). Marshall described it as “seeing kids’ eyes light up when they had the ability to create something.” And for Ted, this approach to teaching the curriculum can be scary for students who are used to traditional models, but then it empowers them to see their place within school, the workplace, and life beyond school. Which, consequently, teachers have a responsibility to help all students learn, develop, and succeed.

4.6 Conclusion

In conclusion, these are the key findings from semi-structured interviews with Marshall, Ted, and Lily, three educators with the Toronto District School Board. These participants presented their understanding and perspectives of 21st century teaching and learning, including
the strategies they use to help their students develop 21st century competencies. With concrete examples, participants integrated ICT into their classrooms, as well as highlighted curriculum resources and professional development opportunities that supported them. The profession of teaching comes with many challenges, and attempting to integrate ICT and help students develop 21st century competencies provides a unique set of barriers that the participants identified with possible solutions. Lastly, the potential for teachers to create environments for students to explore interests and influence future career decisions features prominently in this research study, especially as highly-skilled jobs require 21st century competencies and ICT fluency. In the next chapter, I will discuss the implications of this study in relation to my development as a researcher and teacher, the implications for the educational community, and questions that are important for future research.
Chapter 5: Implications

5.0 Introduction

This research study explores 21st century competencies and ICT in the classroom through findings from semi-structured interviews I conducted with three educators in the Toronto District School Board. In this final chapter, I summarize the findings I reported in the previous chapter to draw implications and highlight specific recommendations. Despite their varying personal and professional backgrounds, participants presented consistent perspectives on the nature of 21st century teaching and learning, including the role of integrating ICT into the classroom to prepare students to become global citizens and enter highly-skilled careers. The interview findings are consistent with the literature review, and this chapter summarizes key findings in relation to 21st century competencies, higher-level integration of ICT, pedagogical approaches and decision-making, and career preparation. The implications I present in this chapter begin with broad implications for the educational community, including policymakers, curriculum planners, administrators, teachers, students, parents, researchers, and teacher education programs. The narrow implications I highlight correspond to my self-reflexivity as a beginning teacher and educational researcher, and how these identities intersect to form my professional identity. Based on these implications, I state specific recommendations for the educational community. As 21st century competencies and ICT are ever-increasingly prevalent in schools and educational policy, this research project has illuminated numerous implications and recommendations for the future of teaching and education. In addition, I identify areas of further research that connect to the topic of 21st century teaching and learning, which will be necessary for educational progress.
5.1 Overview of key findings and their significance

Participants in this research study discussed how they understand and implement “21st century” teaching and learning in their classrooms, which consistently concurred with the educational research I reported in the literature review. In relation to the themes I discussed in the previous chapter, three significant areas I summarize here are the parallel conceptualizations between participants and the literature regarding 21st century frameworks, ICT integration in the classroom, and pedagogical strategies and career-relevant instruction.

5.1.1 Key findings in relation to 21st century frameworks

Participants’ interpretations of 21st century teaching and learning aligned closely with established frameworks regarding the teaching of 21st competencies published within the last 10 years. Fullan and Langworthy (2014) highlight six competencies that schools committed to 21st century learning through ICT help students to develop: character education, citizenship, communication, critical thinking and problem solving, collaboration, and creativity and imagination. Other researchers and policymakers define 21st century competencies in a similar manner (C21 Canada, 2012; ISTE, 2007; TDSB ICT Standards, 2009; Trilling & Fadel, 2009; U.S. National Research Council, 2011). All of the participants explicitly referred to these competencies as important for their students to develop in their classrooms, while indicating their dynamicity. Rothertham and Willingham (2010) and Trilling and Fadel (2009) state the importance of 21st century competencies for employability, even though as the participants emphasized, the relevance of specific competencies for the classroom will continue to change to adapt to career trends. Research participants, in accordance with the literature, stressed the importance of developing these competencies within the educational context of schools that support mistakes and failure (“Assessing 21st century skills,” 2011). 21st century competencies
are important for students to develop for their intersectional identities (professional, academic, sociocultural, etc.) after they leave school to live and work in a globalized, technology-infused world. Thus, the ways in which the participants conceptualized 21st century teaching and learning had a strong connection to the literature, which provided consistency for this research and did not create any surprises.

5.1.2 Key findings in relation to the integration of ICT in the classroom

Participants indicated the role of ICT in the classroom as a ubiquitous tool for teachers and students to learn, engage with the curriculum, and develop 21st century competencies. The literature focuses on using technology as a tool to develop higher-order thinking skills, such as the ability to analyze, evaluate, and create, especially in collaborative technological and online environments (Churches, 2009; ISTE Standards for Students, 2007; TDSB ICT Standards, 2009). In each of the participants’ classrooms, technology and curricular instruction are integrated to help students develop skills, learn content, and prepare to be active citizens of the world around them. According to the participants, their students learn how to mobilize knowledge and become creators of content that have applications beyond the classroom, and they demonstrated this by providing specific examples that I presented in the previous chapter (e.g. Ted’s students used social media to inform the public about the environmental impacts of artificial Christmas trees). Consistent with the SAMR model (Puendetura, 2010) and Fullan and Langworthy (2014), participants suggested that the integration of ICT in the classroom can help unleash deeper learning for students, in which they are collaboratively creating content that will have an impact in their greater community or authentically simulate experiences in the real world.
5.1.3 **Key findings in relation to pedagogical strategies and career-relevant instruction**

A key finding in this research study is that the participants identified a spectrum of teaching methods and pedagogical approaches among them and their colleagues that range from traditional, content mastery approaches to modern, deeper learning that integrates ICT and 21st century competencies. The participants appear to be approaching their profession with similar exemplary practices to those outlined by Hargreaves and Moore (2000), such as making connections to real issues in students’ lives. The units and projects described by these participants demonstrated cross-curricular experiences that they perceived engaged their students and made classroom content more relevant to their lives and future careers.

Participants in this research study highlighted the shift in Canada towards higher-skilled jobs that require 21st century competencies, as reinforced in the literature (HRSDC, 2011; Trilling & Fadel, 2009). They also acknowledged the trend towards jobs in science, technology, engineering, and mathematics, but noted that 21st century competencies and ICT are relevant across all fields. By making their classrooms and teaching practice relevant to these contexts, the participants expressed a higher level of student engagement and motivation that coincides with research-based outcomes of career-relevant instruction (Hargreaves & Moore, 2000; Orthner, Jones-Sanpei, Akos, & Rose, 2013).

5.2 **Implications**

The findings reported in this research study have implications across a variety of contexts for the educational community, as well as for myself personally as a beginning teacher and educational researcher. In this section, I discuss the broad implications of this study for 21st century teaching and learning for teachers, students, parents, administrators, researchers,
policymakers, curriculum planners, and teacher education programs. As a member of the educational community, these findings have implications for myself as I reflect on my teaching and educational research experiences, as well as develop my personal philosophy of education and professional practice.

5.2.1 Broad implications for the educational community

This research study has important implications for educational reform and progressive change. In a broad sense, this study should serve as a reminder for all educational stakeholders to keep instruction, planning, assessment and evaluation, funding, and policy grounded in the needs of the students and the environment that will best support their future as citizens of a globalized, changing, and technology-infused world. Consistent with the research of Fullan and Langworthy (2014), the integration of ICT into the classroom is based in deep learning pedagogies, in which the digital tools (hardware and software) are interconnected with the new learning partnerships between teachers and students, as well as the learning tasks that are relevant to experiences beyond the classroom and the development of 21st century competencies. As funding and budgetary concerns continue to plague school boards—the TDSB had a projected deficit of $16.5 million for the 2015-16 school year (TDSB, 2015)—it will be challenging to allocate funds dedicated toward 21st century teaching and learning, including the ICT and curriculum resources that will support these efforts.

As educational policymakers and curriculum planners develop 21st century frameworks and revise curriculum, the findings in this study show that the competencies that are relevant to careers, postsecondary education, and global citizenship are dynamic. Pompa (2015) and Casserly (2012) highlight current trends towards highly-skilled careers in technological
innovation and convergent fields, especially in areas related to health and social assistance, construction, technology and big data, manufacturing, hospitality and tourism, and creative industry. However, in-demand careers can change as societies, industries, and economies evolve to meet new needs. As Ted indicated in his interview, career-focused postsecondary programs are also evolving and changing to match careers and the job market. Therefore, this study concludes that relevant 21st century policy and curriculum cannot be static and too focused on specific postsecondary experiences that may not exist (or be in-demand) when students get the opportunity to explore them and make important decisions in their lives.

For teachers, students, parents, and other stakeholders directly involved in the day-to-day schooling, this study has three specific implications for 21st century teaching and learning, ICT integration, and career-relevant instruction. Firstly, emphasis on 21st century competencies and career-relevant instruction can empower students to explore personal interests and develop skills that they can apply to a variety of highly-skilled careers. The literature and the participants in this study indicate that classroom environments that connect to real-world contexts produce more engaged and motivated students, which is a benefit for all stakeholders (Hargreaves & Moore, 2000; Orthner, Jones-Sanpei, Akos, & Rose, 2013). Nevertheless, planning, executing, and assessing this type of learning requires a great deal of professional motivation, resources, and other supports for teachers to overcome the numerous obstacles they will encounter. As a result, a second implication for teachers is that they can embrace growth and exploration into new technologies, strategies, and pedagogies as part of attending to dynamic 21st century competencies through professional development and collegial relationships. Having a personal competency or passion for ICT could provide an advantage for educators, however teachers can compensate insufficiencies with a professional motivation to explore, try new things, and
problem solve, similarly to the teachers described by Hargreaves and Moore (2000). Thirdly, for
teachers seeking to implement new ICT in their classroom, digital tools must connect to
pedagogies that support higher-level thinking skills and authentic learning in which students are
redefining the construction of knowledge (Churches, 2009; Puendetura, 2010). For members of
the educational community involved in day-to-day schooling, these are three important
implications to consider for progress and reform in 21st century teaching and learning.

5.2.2 Narrow implications as a self-reflexive teacher and researcher

Throughout this research project, I have continuously reflected on my beliefs about
education, professional practice, and research interests. My passion for engaging students to
learn using real-world contexts and technology has grown during this process. The participants in
this study have shown me the immense potential of integrating ICT and developing classroom
environments that foster 21st century learning. I know that creating this type of environment can
be extremely challenging, especially if there is a lack of support from the school, colleagues,
administrators, or a lack of curriculum resources, or the available hardware and software tools. In
my practicum placement experiences, I have had success implementing ICT into my teaching
practice in areas such as science, math, and literacy. For example, in grade eight science my
students used Explain Everything (a tablet-based interactive whiteboard app) to learn and apply
knowledge of water systems. And in literacy, these same students used Storify.com to
independently create social media news stories. However, this school had plentiful access to
digital resources, with the majority of students coming from affluent socioeconomic
backgrounds. In contrast, other schools in which I have taught and volunteered in received less
funding and available resources that needed to be shared across multiple classrooms. Therefore, I
have become increasingly aware of inequities in resource allocation and the realities of the
profession. Regardless of the equitable access to technology, this study has contributed to inspire me to create relevant learning experiences for students, which empowers them to develop interests and skills that can transfer to new contexts in the future.

As an educational researcher, this has been my first extensive research project. The process of learning and applying qualitative research methods was a reflexive experience. My goals and understanding of 21st century competencies have evolved considerably since beginning the study two years ago. Initially, I had envisioned researching 21st century competencies to contribute toward the literature concerning career-focused schooling. However, these competencies are not only relevant to careers in the 21st century, but life as a global citizen. I was drawn to this research, because of the prevalence of “21st century” in educational literature, policy, and communities, and because I experienced the relevance of these competencies during my undergrad in the Ryerson University School of Journalism. At first this study valued students’ learning as passive consumers serving the job market. Now I believe this area of research is even more pertinent to the future of education and preparing students to become active citizens who critically engage with the systems and societies in which they exist. As I complete my Master of Teaching degree and earn my teaching certification, I intend to continue learning, networking, and researching about 21st century learning and educational technology to help me become a better educator and create relevant experiences for my students.

5.3 Recommendations

Based on the findings and implications of this research study, I have recommendations for educational policymakers (ministries and school boards) and teachers.
5.3.1 Recommendations for the Ontario Ministry of Education

Based on the findings in this research study, I recommend that the Ontario Ministry of Education develop an official policy for 21st century teaching and learning, which will act as a framework and mandate teachers to implement ICT and 21st century competencies. Fortunately, there is evidence to show that this is already taking place! In December 2015, the Ministry published a foundation document for discussion to help shape the provincial policy for 21st century competencies in Ontario’s education system (Ontario Ministry of Education, 2016). This is a major step forward for 21st century education and ICT integration in the Province of Ontario, as this draft document already provides a framework for educators. Building upon established international 21st century learning frameworks, including many referenced in this study, the Ontario Ministry of Education (2016) has developed its own framework (Figure 5.1) to help address the specific needs and goals of Ontario educators and students (C21 Canada, 2012; Fullan & Langworthy, 2014; ISTE, 2007; National Research Council, 2012). Therefore, I recommend that educational policymakers in Ontario recognize that these competencies are dynamic and their relevance to careers, postsecondary education, and global citizenship could change in the future. This needs to be an ongoing discussion between policymakers, educators, industry, and the public.

Moving forward, it is imperative that this discussion continue and that the Ontario Ministry of Education publishes an official policy on 21st century teaching and learning for school boards, administrators, teachers, and all other stakeholders to reference in accessible literature, and further adapt it to curriculum for the classroom. With this official policy, the government can continue revising curriculum to reflect 21st century competencies and encourage teachers to use ICT to help students develop them. Based on an upcoming official policy and
future revised curricula, participants in this study recommended that the government, school boards, and other organizations develop curriculum resources (e.g. literature, programs, coaches) to support teachers in their efforts to integrate 21st century competencies and ICT.
**21st Century Competencies and ICT Integration in the Classroom**

*Figure 5.1: Draft framework for 21st century competencies (Ontario Ministry of Education, 2015)*

<table>
<thead>
<tr>
<th>Critical Thinking and Problem Solving</th>
<th>Innovation, Creativity, and Entrepreneurship</th>
<th>Learning to Learn / Self-Aware &amp; Self-Directed Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Solves meaningful, real-life, complex problems (1), (6)</td>
<td>• Contributes solutions to complex problems (3)</td>
<td>• Learns the process of learning (metacognition) (1),(3),(4),(5),(7)</td>
</tr>
<tr>
<td>• Takes concrete steps to address issues</td>
<td>• Enhances a concept, idea, or product</td>
<td>• Believes in the ability to learn and grow (growth mindset) (1), (4), (5)</td>
</tr>
<tr>
<td>• Designs and manages projects</td>
<td>• Takes risks in thinking and creating</td>
<td>• Perseveres and overcomes challenges to reach a goal (1), (5)</td>
</tr>
<tr>
<td>• Acquires, processes, interprets, and analyses information to make informed decisions (critical and digital literacy)</td>
<td>• Makes discoveries through inquiry research (1)</td>
<td>• Self-regulates in order to become a lifelong learner (1), (4), (5), (7)</td>
</tr>
<tr>
<td>• Engages in an inquiry process to solve problems (1)</td>
<td>• Pursues new ideas to meet a need of a community (3), (6)</td>
<td>• Reflects on experience to enhance learning (1), (7)</td>
</tr>
<tr>
<td>• Makes connections and transfers learning from one situation to another (1), (6)</td>
<td>• Leads and motivates with an ethical entrepreneurial spirit (1), (3)</td>
<td>• Cultivates emotional intelligence to understand self and others (1), (2), (4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Communication</th>
<th>Global Citizenship</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participates in teams; establishes positive relationships</td>
<td>• Communicates effectively in different contexts in oral and written form in French and/or English</td>
<td>• Contributes to society and the culture of the local, global, and digital community in a responsible, accountable, and ethical manner (2), (6)</td>
</tr>
<tr>
<td>• Learns from, and contributes to, the learning of others (1)</td>
<td>• Asks effective questions to acquire knowledge (6)</td>
<td>• Engages in local and global initiatives to make a difference (6)</td>
</tr>
<tr>
<td>• Co-constructs knowledge, meaning, and content (1)</td>
<td>• Communicates using a variety of media (1), (5)</td>
<td>• Learns from and with diverse people (2), (5), (6)</td>
</tr>
<tr>
<td>• Assumes various roles on the team</td>
<td>• Selects appropriate digital tools according to purpose (1)</td>
<td>• Interacts safely and responsibly within a variety of communities (5), (6)</td>
</tr>
<tr>
<td>• Manages conflict</td>
<td>• Listens to understand all points of view (2), (3), (6)</td>
<td>• Creates a positive digital footprint</td>
</tr>
<tr>
<td>• Networks with a variety of communities/groups</td>
<td>• Gains knowledge about a variety of languages (2), (6)</td>
<td>• Relates to the environment and is mindful of the importance of all living things (2), (3)</td>
</tr>
<tr>
<td>• Respects a diversity of perspectives (2), (3)</td>
<td>• Voices opinions and advocates for ideas</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Global Competencies Draft Scoping Plan and Related CMEC Areas</th>
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<tbody>
<tr>
<td>(1) Teaching and Learning</td>
</tr>
<tr>
<td>(1)</td>
</tr>
</tbody>
</table>
5.3.2 Recommendations for teachers

For teachers, I have three specific recommendations: (1) develop a personal 21st century framework and integrate ICT using deep learning pedagogies; (2) develop a professional network of colleagues and other educators; and (3) keep pace with career and postsecondary education trends.

(1) Teachers who are committed to 21st century teaching can develop their own framework of relevant competencies for their students, building upon existing frameworks referenced in this study or using the draft document from the Ontario Ministry of Education (2015) until there is an official policy. With these competencies as a guideline, teachers can ensure that every lesson, project, assessment, or evaluation they implement in their classroom—with or without ICT—connects to one or more of these competencies. The draft document offers concrete expectations for students that teachers can apply to any grade level and subject area. Through the lens of 21st century competencies, teachers can integrate ICT into their classrooms to help students develop higher-thinking skills and use technology to transform the learning experience. I recommend that teachers use technology to launch a deeper engagement with curriculum and redefine learning tasks to create knowledge that has relevance beyond school.

(2) Participants in this research study recommended that teachers—especially new teachers—develop a professional network of colleagues and other educators who share similar interests and commitments to 21st century learning and ICT. If possible, I recommend that teachers prioritize developing these professional relationships within their own school, since participants expressed the benefits of in-school allies. However, as Ted indicated, teachers may have to develop their professional network outside of school by attending conferences, workshops, or using Twitter and other online communities. This encourages the sharing of
information and perspectives across various contexts united by the common goal of improving schools and supporting student needs.

(3) Lastly, since 21st century competencies connect to in-demand careers and postsecondary education, I recommend that teachers—especially secondary teachers—stay informed and keep pace with career trends and postsecondary programs. As a majority of these jobs will be highly-skilled positions requiring 21st century competencies, teachers need to be aware of the career landscape that their students will enter (Trilling & Fadel, 2009; HRSDC, 2011). Therefore, teachers should work with guidance counsellors, recruiters, and local businesses to stay informed and be certain that the competencies will prepare students for a variety of potential careers.

5.4 Areas for further research

This research study has expanded upon the present literature concerning 21st century competencies and ICT integration, however it has also highlighted the need for further research in several significant areas. Since ICT is interconnected with 21st century learning, research is needed to better understand the inequities and systemic barriers that prevent certain schools, teachers, and students from accessing these tools and resources. Anti-classist research is needed to affect policies and funding for underprivileged schools who lack resources (computers, tablets, SMARTboards, Wi-Fi access, etc.). A related important area that needs further study is the role of culturally-relevant and responsive pedagogy in relation to 21st century teaching and learning to ensure that all students can access the opportunities that will help them develop these competencies, regardless of race, ethnicity, gender, ability, sexual orientation, or any other personal identity. The TDSB is already addressing these inequities through Model Schools for
Inner Cities and its commitment to implement Wi-Fi access in every classroom across the board (TDSB, 2015). Nevertheless, disparities continue to exist and more work in this area can help all teachers and students better access 21st century learning.

Further research is also needed to support new teachers by examining how pre-service teacher education addresses the reconstruction of traditional teaching methods and pedagogical strategies. Participants in this study demonstrated a willingness to grow professionally and valued that over their personal competency with ICT. In regards to integrating ICT successfully, further research supporting pre-service teachers’ learning and practice with classroom-based ICT may help increase the effectiveness of in-service teachers. If teacher candidates are not using these tools before they become qualified teachers, how will they be prepared to use them in the classroom? Additionally, research in teacher burnout and support for new teachers is critical, so that people entering the profession can maintain a passion for trying new strategies and implementing ICT into their teaching practice.

5.5 Conclusion

21st century competencies are integral for students to succeed as citizens in a globalized, technology-infused world, which includes employability in highly-skilled jobs. Various frameworks highlight specific competencies, with the Ontario Ministry of Education (2016)—building upon existing frameworks—currently emphasizing six competencies for students to develop between kindergarten and grade 12. Participants in this research study stressed that 21st century competencies need to adapt to changes in career trends and postsecondary education. For these educators, they believe school is the best place for children and adolescents to develop competencies in an environment that supports mistakes and failure. Using information and
communication technologies (ICT), students can develop higher-order thinking skills that intersect with 21st century competencies. These teachers that are successfully integrating ICT into their practice ubiquitously infuse technology with the curriculum holistically through instruction, assessment, and evaluation to create learning experiences that connect to the world beyond the walls of their classrooms. Students can use technology to create and mobilize knowledge through deep learning tasks consistent with the frameworks of Fullan and Langworthy (2014) and Puendetura (2010). By approaching teaching through the lenses of career-relevant instruction and global citizenship, these teachers reported an increased level of student engagement and motivation.

For the educational community, this study has important implications for progress and reform. Policies, curricula, and funding can deeply impact the effectiveness of teachers integrating 21st century competencies and ICT. If resources—digital tools and curriculum resources—are not available to teachers, they will be at a disadvantage for implementing 21st century learning. Furthermore, this approach to classroom instruction can empower students to explore interests and develop career-relevant competencies. This requires teachers who are competent with ICT, as well as motivated to seek out professional development, like-minded colleagues, and authentic experiences for their students. Any ICT, whether hardware or software, must connect to pedagogies that transform learning and require students to use higher-level thinking. Personally, as a teacher-researcher I was intrigued by the predominant presence of the phrase “21st century” in the educational community, despite the century being more than a decade and a half old. Nevertheless, I believe that these competencies have substance and importance for the students of today and tomorrow. With a commitment to being a 21st century
Looking forward, the Ontario Ministry of Education (2016) is demonstrating significant progress by drafting a framework for 21st century competencies, and it will be crucial for this province that this discussion continues to inform official policies, curriculum, and educational technology. Teachers committed to reforming education for the 21st century can develop a personal framework of competencies and integrate ICT using deep learning pedagogies. In addition, they can develop a professional network of colleagues to support them in their efforts, as well as keep pace with career and postsecondary education trends to ensure their classrooms are as authentic as possible. With this uncertain and undetermined future for our students, educators are searching for ways to prepare the next generation to become active citizens in an increasingly technological and globalized world. From policymakers to researchers to classroom teachers, each of us has a responsibility to create accessible opportunities for students to develop relevant competencies for life in the 21st century.
References


Appendix A: Letter of Consent for Interviews

Date:

Dear _______________________________,

My Name is Dillon Lobo and I am a student in the Master of Teaching program at the Ontario Institute for Studies in Education at the University of Toronto (OISE/UT). A component of this degree program involves conducting a small-scale qualitative research study. My research will focus on teaching 21st century competencies to prepare students for future careers. I am interested in interviewing teachers who actively prepare their students for 21st century competencies. I think that your knowledge and experience will provide insights into this topic.

Your participation in this research will involve one 45-60 minute interview, which will be transcribed and audio-recorded. I would be grateful if you would allow me to interview you at a place and time convenient for you, outside of school time. The contents of this interview will be used for my research project, which will include a final paper, as well as informal presentations to my classmates and/or potentially at a research conference or publication. You will be assigned a pseudonym to maintain your anonymity and I will not use your name or any other content that might identify you in my written work, oral presentations, or publications. This information will remain confidential. This data will be stored on my password-protected computer and the only people who will have access to the research data will be my course instructors Dr. Angela MacDonald-Vemic and Rodney Handelsman. You are free to change your mind about your participation at any time, and to withdraw even after you have consented to participate. You may also choose to decline to answer any specific question. I will destroy the audio recording after the paper has been presented and/or published, which may take up to a maximum of five years after the data has been collected. There are no known risks or benefits to participation, and I will share with you a copy of the transcript to ensure accuracy.

Please sign this consent form, if you agree to be interviewed. The second copy is for your records. I am very grateful for your participation.

Sincerely,

Dillon Lobo

647-210-****
dillon.lobo@mail.utoronto.ca

Course Instructors’ Names: Dr. Angela MacDonald-Vemic and Rodney Handelsman

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Consent Form

I acknowledge that the topic of this interview has been explained to me and that any questions that I have asked have been answered to my satisfaction. I understand that I can withdraw from this research study at any time without penalty.

I have read the letter provided to me by Dillon Lobo and agree to participate in an interview for the purposes described. I agree to have the interview audio-recorded.

Signature: ______________________________

Name: (printed) ______________________________________________

Date: ______________________________________
Appendix B: Interview Questions

Thank you for participating in this study. The purpose of this research is to learn about 21st century competencies, including how teachers understand the term and how they apply it to their teaching practice. The interview should last approximately 30-60 minutes, and I will ask you a series of questions about your beliefs and values in relation to 21st century competencies, as well as your practice in the classroom. You may refrain from answering any of the questions, or change or retract your answers at any time. Do you have any questions or concerns before we begin?

Section 1: Background Information
1. Please state and spell your name. What school and board do you work for? What grade and subjects do you teach?
2. How many years have you worked as a teacher? How many years at your current school?
3. Can you tell me more about the school you currently work in? (size, demographics, program priorities)
4. As you know, I am interested in learning how teachers prepare students for career relevant 21st century competencies. Can you tell me more about how you developed an interest and commitment to this area? *probe re: personal, professional, and educational experiences
5. Are you aware of any policies or strategies explicitly related to developing students’ 21st century competencies in your provincial Ministry of Education or school board? If yes, what are the policies/strategies?

Section 2: Why (Beliefs/Values)
6. What does the term “21st century competencies” mean to you? What competencies do you believe are 21st century relevant and why?
7. Why are 21st century competencies important for students to develop in school?
8. In your view, what is the role and responsibility of schools in preparing students for careers? To what extent do you believe they fulfill that role and responsibility? In your view, are schools preparing students for career relevant 21st century competencies? How/how not?
9. In your view, what is your role and responsibility in preparing students for careers in the current and future labour market?
10. What do you believe are some of the careers and skills that the future labour market will require?
11. What do you believe are some essential tools and resources required for schools and teachers to prepare students for 21st century competencies? Do you have access to these in your current school?

Section 3: What/How (Teacher Practices)
12. How do you prepare students for the 21st century competencies that you identified?
   ▪ What competencies do you prioritize and why?
   ▪ What kinds of opportunities for learning do you create for students to learn these competencies?
13. Where in the curriculum do you create these opportunities? (which grades, subject areas, strands)
14. What instructional resources do you use to prepare students for developing 21st century skills?
15. How do your students typically respond to learning these competencies? What outcomes do you observe from them? What indicators of learning do you see from them?

Section 4: Barriers/Next Steps
16. What resources and factors support your ability to teach 21st century skills?
17. What challenges have you faced teaching 21st century competencies? How did you respond to these challenges? How might the education system further help you to respond to these challenges?
18. What next steps do you think are necessary to continue developing your classroom and preparing your students for 21st century competencies?
19. What advice, if any, do you have for beginning teachers committed to supporting the development of 21st century competencies?

Thank you for your time and participation.