Teachers' perceptions of online teaching: Developing personalized teaching in asynchronous virtual high schools

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1. Introduction

Online education from kindergarten to grade 12 (K-12) has exponentially increased in the last two decades, and continues to grow at an alarming rate. In 2001, it was estimated that between 40,000 and 50,000 students were enrolled in online courses in the United States (US), while only ten years later, that number had skyrocketed to four million (Barbour & Harrison, 2016). Research suggests that by 2019, half of the high school students in the US will be enrolled in online courses (Morgan, 2015). In Canada, the growth of online K-12 education has been significantly slower than in the US. An estimated 25,000 students were enrolled in online courses in 2001, reaching approximately a quarter-million in the 2011-2012 academic year (Barbour, 2012). In contrast to the US, growth of online learning in Canada has been uneven and only focused in certain regions, particularly the provinces of British Columbia and Ontario (Barbour, 2012). Nonetheless, progressive government regulation and funding structure are slowly appearing in several provinces throughout Canada (Barbour, 2012).

The majority of K-12 students enrolled in online courses in both the US and Canada are at the secondary school level. Pursuing online courses implies that students will be completing courses at a distance, however most of these courses are offered through their regular schools, from where students can access course resources (Morgan, 2015). In contrast, virtual schools are approved schools that are accessible entirely through the internet, without a brick-and-mortar presence available for students' access. Virtual schools in Canada are becoming increasingly common, and more than two-thirds of virtual high schools in Canada deliver online courses either mostly or completely asynchronously, without any synchronous components. Only a negligible number of virtual schools in Canada offer courses that rely solely on synchronous teaching (Murphy, et al., 2011).

Due to the innovative demands brought forward by rapid advancements in technology, educators have firmly supported the integration of learning and communication technologies into schools and distance education courses (Levin & Wadmany, 2005). Many teachers believe that using technology in teaching can be very effective in stimulating critical thinking and self-regulated learning, and evidence shows that teachers' beliefs influence the choice teachers make about the use of technology for pedagogical purposes (Croft, et al., 2010). However, many researchers have

criticized the rapid growth of online education, citing insufficient time and evidence to evaluate the effectiveness of online teaching and learning. A large number of virtual schools in the US have performed ineffectively, revealing low student achievement compared to students in traditional schools (Morgan, 2015). Some of the most attractive aspects of online learning, such as the ability to work with a flexible schedule, are, in practice, not very accurate, and create trade-offs with other desired aspects of online learning (Hassenburg, 2009). Oversight and accountability in online courses are inadequate (Morgan, 2015), and the vast majority of successful students in the virtual schooling environment tend to be those who have high intrinsic motivation and independent learning orientations, with strong time management, technology, and literacy skills (Barbour & Reeves, 2009). These characteristics of self-regulated learning are typically more realistic of adult learners, hence the heavier focus of online education research on post-secondary students (Barbour & Reeves, 2009).

Early research on virtual secondary schools has focused primarily on their effectiveness compared to traditional face-to-face classroom settings, as opposed to on course design and delivery issues (Murphy, et al., 2011). The emergence of predominantly asynchronous virtual high schools has generated a strong need to reassess the roles of teachers in an online environment and think about traditional pedagogical techniques in new ways (Riggs & Linder, 2016). Pedagogy was determined to have a greater positive effect in an asynchronous environment, compared to in a synchronous setting (Murphy, et al., 2011), showing that even in asynchronous courses teacher leadership is an essential element, without which students may find it challenging to succeed (Borup, et al., 2014).

Despite the fact that online courses have the capability of integrating a wide array of web-based technologies to enhance the teaching and learning experience, the majority of the course content remains highly rigid (Borup, et al., 2014). A large proportion of teachers do not supplement online learning technologies much in their course design due to several external factors, including a high student to teacher ratio where teachers view themselves primarily as graders with insufficient time to provide any personalized instruction or facilitate adequate interaction. A very small proportion of teachers in Canada feel that online learning technologies provide effective interactivity (Kay, et al., 2009). Such perceptions may be largely due to the underdeveloped knowledge of the available

technologies and the lack of support from teacher educators in implementing these technologies. Therefore, well-grounded and widely accepted fundamentals of course design and facilitation still need to be achieved to support teachers in virtual schooling (Riggs & Linder, 2016).

Despite the rise of virtual schooling there has been little focus in teacher education on online teaching, and addressing any gaps in pedagogy and training (Barbour & Harrison, 2016). The lingering perceptions about quality differences between traditional face-to-face and online asynchronous education indicate a professional development gap; a gap that can be bridged with adequate training about active learning pedagogy (Riggs & Linder, 2016). The ability of current teacher education programs to adequately prepare teachers to design, deliver, and support has been deficient, and only a small number of schools have promoted training in online teaching (Barbour & Harrison, 2016). The education system in Canada is regulated at a provincial level, resulting in no one uniform approach to the organization and delivery of online courses (Murphy, et al., 2011). Over a decade ago, the Teacher Education Working Group in Ontario recommended the provincial government to work with the faculties of education in the province to develop a common teacher education curriculum and establish province-wide standards (Bennett & Woloshyn, 2003). However, a standardized set of teacher education guidelines is yet to be established.

The context of this study involves completely asynchronous online courses delivered at two small-sized private secondary schools in the province of Ontario, where I am engaged in contract course development and teacher education. Both schools are relatively new and have been in operation for less than two years. While enrolment in traditional classroom settings is available, both schools also have the option for students to pursue their secondary school diplomas entirely online. Online enrolment has been increasing at a steady rate, and both schools are planning to eventually become virtual schools, a common trend among new and young private schools in Ontario.

The asynchronous course formats at both schools are fairly rigid, primarily using static, repetitive exercises. Furthermore, major assessments of learning are entirely in multiple-choice format which provide students with the opportunity to guess, potentially distorting the level of achievement. Opportunities for instructor-learner interaction and learner-learner interaction are limited, with e-mail

messaging and discussion forums being the most commonly used tools. Moreover, feedback is not always received in a timely manner, further diluting the students' learning experiences.

Both schools emphasize personalized instruction, catering to students' needs and interests. Realistically, the most effective way of applying personalized teaching would be to provide one-to-one instruction for every student based on their interests, preferences, needs, and learning styles; a process that was effectively carried out face-to-face at a school where I was formerly the Principal. However, achieving personalization in an asynchronous environment where the course content is highly inflexible is challenging, especially when teachers' knowledge of web-based technologies is lacking and they likely perceive asynchronous online teaching primarily as communicating through e-mail and marking assignments. Teachers have expressed concerns about the lack of administrative support available at the schools, and also the minimal exposure to online education in both pre-service and in-service teacher programs, signifying a need to address the challenges teachers face and adequately prepare teachers to design and deliver online courses.

2. Literature Review

Several factors influencing students' success in online courses have been suggested by various researchers but the vast majority of these studies have concentrated on students' perceptions while overlooking those of the teachers (Barberà, et al., 2016). Drawing upon several studies from over two decades ago, Volery and Lord (2000) state that according to students, one of the most important factors influencing the effective delivery of an online course is related to the conduct of the instructor; yet research focusing on instructors' perceptions of online teaching is relatively recent and underdeveloped. One of the main drawbacks of studying students' perceptions of online courses to determine success factors is that they are not subject matter experts and, therefore, not in a strong position to make judgements about the utility of the course (Barberà, et al., 2016). Furthermore, students may be strongly influenced by biased personal motivations and attitudes, skewing research results (Barberà, et al., 2016). The role of the instructor also becomes more significant in online

education, which is considered an unfamiliar context for many teachers whose belief systems are rooted in traditional classroom settings (Zhao & McConnell, 2008). Therefore, it is important and likely more accurate to use teachers' perceptions to determine the effectiveness of new technologies in classrooms and online teaching strategies (Barberà, et al., 2016).

The following literature review will begin with a focus on teachers' perceptions of technology in the classroom and the importance of administrative support for technology integration. It will then transition into the differences between learning in the classroom and online learning, and the resulting implications for personalized teaching in an asynchronous online environment. The last section of the literature review will shed some light on developments in teacher education for online teaching, particularly in-service teacher education programs.

2.1. Teachers' perceptions of technology and online teaching

The general conjecture of both older and contemporary research studies is that there is a relationship between teachers' beliefs, conceptions, contexts, and pedagogical practice (Thompson, 1984; Confrey, 1995; Skott, 2009; Beswick, 2012). Thompson (1984) states that teachers' beliefs and preferences translate into behavioural patterns that become characteristic of their instructional practice. Skott (2009) offers a more contemporary addition to Thompson (1984), emphasizing that instead of pursuing a highly individualized approach to studying teachers' beliefs, it is insightful to take a more societal stance, factoring in the contextual effects on pedagogy.

Similarly, teachers' beliefs are major determinants of their adoption of technology in the classroom (Shifflet & Weilbacher, 2015; Willis, et al., 2016; Barberà, et al., 2016). Willis et al. (2016) draw upon literature from over two decades ago, namely Bandura (1994), to highlight that individuals with high levels of self-confidence in their abilities generally approach tasks as challenges, whereas individuals with low levels of self-confidence approach tasks as obstacles. Teacher candidates typically enter technology training with low self-confidence and new technologies may seem overwhelming and even threatening. The intimidating perception results in an intensification of the

existing beliefs about the teachers' inability to grasp technology tasks (Willis, et al., 2016). The ability to understand technology tasks strongly influences learners' experiences, as students attending a class with an instructor that promotes the technology and has a positive attitude towards integrating technology are likely to experience more encouraging learning outcomes (Volery & Lord, 2000). In addition, students can face isolation when faced with technical problems, therefore having knowledge of basic troubleshooting tasks is also crucial for instructors (Volery & Lord, 2000). Furthermore, in addition to teachers' confidence, the perceived value of the potential outcome of the technology has also been identified as an influential factor of technology use in the classroom (Shifflet & Weilbacher, 2015). The potential outcomes of technologies may not be accurately understood by teachers, further hindering the adoption of technologies in the classroom. If teachers are unsure about how exactly the technologies proposed for use in the classroom are going to help learners, they are less likely to pursue them.

It is difficult for teachers to not only learn the new technologies but also incorporate them into their pedagogy to be "as symbolically charged as a piece of chalk writing on a blackboard" (Fine, 2016, p. 12). The high resistance to integrating and promoting technology within the classroom needs to be addressed by providing teachers with rich extended experiences in technology integration (Willis, et al., 2016). The resistance experienced is not only limited to the classroom, but also occurs during the adaptation to various contexts, such as online teaching (Ploeg, 2012). Adapting to an online teaching environment brings forth a complex set of intertwined challenges where teachers must add to their content knowledge and enhance their instructional skillset by learning about technology integration and utility, modifying instruction for online delivery, developing appropriate online assessments, and even designing fully online courses (Ploeg, 2012). Fine (2016) emphasizes that teachers in an online environment feel a disconnection from their "ideas of what they perceived a teacher to be" and have to "revise the instructional models they have been using for many years to properly teach online" (p. 20). Many teachers feel online courses are more ideal for problem-based learning (Willis, et al., 2016), making mathematics a suitable subject for online teaching where each step of a mathematical process can be clearly shown.

The focus on the process to obtain the product has been linked to the constructivist philosophy of mathematics by Forgasz and Leder (2008). Teachers holding beliefs in social constructivism highly value student-centered or learner-centered approaches in the classroom and are more likely to embrace the use of innovative technologies to enhance students' learning experiences (Cho, et al., 2017). Several studies emphasize that learner-centered teaching is a pedagogical process that highly engages learners and creates an environment that promotes socially conscious collaboration among peers and between teachers and students (Qutoshi & Poudel, 2014; Borup, et al., 2014; Cho, et al., 2017). Similarly, the Community of Inquiry (CoI) framework (Figure 1), originally developed by Garrison et al. (2000) to examine computer-mediated distance learning, is a collaborative-constructivist learning model which can be applied to study online learning (Borup, et al., 2014). The CoI model assumes that learning occurs within the 'Community', which is defined by the interaction of three core elements: cognitive presence, social presence, and teaching presence (Garrison, et al., 2000). Cognitive presence refers to the extent to which participants are able to construct meaning through ongoing communication, social presence is the ability of the participants to project their personal characteristics into the community, and teaching presence entails the design, facilitation, and guidance of the cognitive and social processes towards meaningful learning outcomes (Borup, et al., 2014).

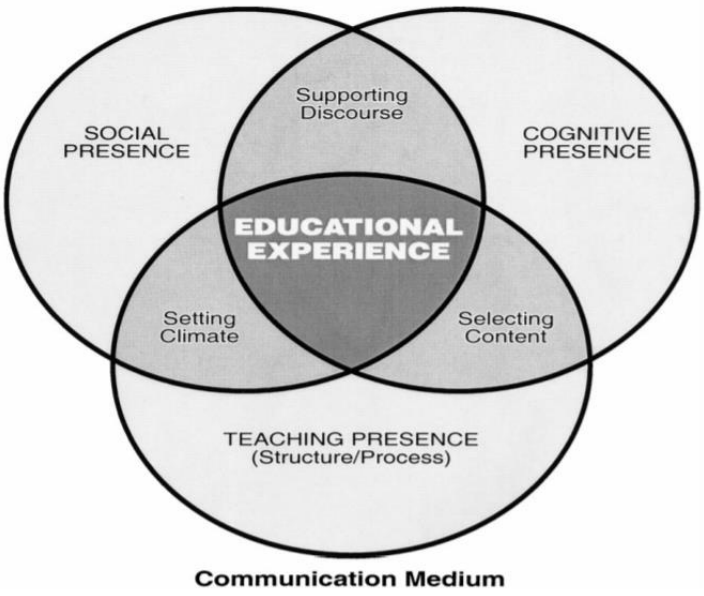

Figure 1: Elements of the Community of Inquiry model (Garrison, et al., 2000)

In a study involving 67 school principals and 82 teachers across 33 secondary schools, strongly positive constructivist beliefs were identified regarding the ability of online learning technologies to improve student-centered teaching approaches, further supporting the CoI framework (Alghamdi & Prestridge, 2014). However, Anderson (2017), one of the original developers of the CoI model, emphasizes that due to the rapid advancement of online technologies, teachers may need to develop more skills and abilities to fully leverage the power of communities of inquiry. Teachers face barriers to the implementation of technologies and there is a need for the model to also recognize motivation, self-efficacy, and personal skills to enhance CoI effectiveness (Anderson, 2017).

2.2. Technology integration and administrative support

Enhancing enrolment and retention in education requires attention to both teaching and learning (Hurson, et al., 2011). In terms of technology use in education from a teaching perspective, Kucirkova and Flewitt (2018) identify five principal external barriers that impede technology integration in education: technical problems, lack of time, lack of access to resources, lack of teacher confidence, and lack of effective training. Improving teachers' confidence and making them comfortable with their own technology skills as well as using the available technologies is a challenge (Shriner, et al., 2010). Adoption of technology in the classroom is not solely based on teachers' confidence and is strongly influenced by "training, education, and encouraging faculty to have the necessary skills and confidence" in the implementation of educational technologies (Shriner, et al., 2010, p. 38). Therefore, there is a strong link between the level of teachers' confidence in technology use and the amount of in-service teacher education teachers receive. In a three-year longitudinal study conducted by Levin and Wadmany (2005), teachers received ongoing training on the effective integration of technology for teaching and learning in the form of several weekly workshops. By the end of the study, participants felt a significant change in their beliefs and practice, highlighting that a "change in practice might form a precursor to a change in beliefs" and indicating a "reciprocal rather unidirectional link between teacher classroom practices, change in teachers' educational beliefs and between teachers' knowledge restructuring processes" (p. 298).

The context, or setting, of the class has also been shown to have a significant influence on teachers' confidence. In different contexts teachers select different approaches and this is often related to their confidence. If the teachers are unfamiliar with the context, such as in online courses, and therefore unsure about the appropriate approach, their confidence is typically described as low (Sadler, 2013). The context of a virtual school, where teaching exists entirely online, is a relatively new one and Fine (2016) emphasizes that teachers in an online setting feel a disconnection with students, regardless of the format being synchronous or asynchronous, significantly lowering their confidence in their ability to teach effectively and fully understand students' needs. Sadler (2013) further found that new teachers expressed that an increase in confidence helped develop a clearer understanding of the specific role required in the given context.

Similarly, from a learning perspective, Hara (2000) highlights that students enrolled in virtual online courses experience distress, rooted in two major foci: technological problems and communication. Inadequate instructors' practices pertaining to managing communication with students lowers students' satisfaction with the courses, with students reporting confusion, anxiety, and frustration due to the lack of prompt or clear feedback, and ambiguous instructions both on the course webpage and in e-mail messages from the instructor (Hara, 2000). Clear instructions and an organized layout are particularly important to students using web-based learning technologies (WBLTs) (Kay, et al., 2009). Sobel et al. (2009) further emphasize that one of the most criticized instructional design aspects of online course delivery is the interaction pattern between students and teachers. The online format makes it more difficult for many students to communicate and build rapport with their instructors and their peers. Although the ability to learn independently is important for success in an online environment, social interaction and participation can significantly influence online learning outcomes (Kim, et al., 2014), resonating with the CoI framework of distance learning. Online courses are criticized for having unclear learning outcomes and an unnecessary excess of introductory content (Sobel, et al., 2009). Furthermore, it is common for students in online courses to work at home in the night, creating conditions where it is difficult to handle issues that can be typically discussed and

resolved more readily in a traditional face-to-face classroom setting (Hara, 2000), highlighting the trade-off between scheduling flexibility and communication sufficiency.

Sadler (2013) highlights that in a two-year longitudinal study involving eleven teachers, teachers used more interactive approaches and communicated more frequently and actively with students as their self-efficacy increased. Several factors have been identified as being the most effective in increasing teachers' confidence in the classroom setting, including basic teacher education in teaching skills (Pelton, 2014). In contrast, technology training specifically aligned with curriculum expectations and relevant to what teachers are trying to achieve in the classroom is more helpful than training that is limited to the development of basic technology skills (Willis, et al., 2016). Teachers need to receive intensive training in the integration of technologies in the classroom and how they can be specifically adapted to benefit the curriculum (Shriner, et al., 2010). Furthermore, trying to achieve this in a virtual schooling environment adds to the complexity of determining the ideal form of teacher education pedagogy and administrative support required.

Teacher students have stated that virtual schooling is not mentioned in pre-service workshops and the lack of in-service support of administration has been cited as one of the reasons of the lack of success of virtual schools. Teachers' perceptions are difficult to change and until they are changed, online schooling will face development challenges (Barbour & Harrison, 2016). Shriner et al. (2011) draw upon multiple studies to assert that the completion of even a short workshop can result in a significant change in teachers' perceptions, behaviours, and attitudes at the elementary, middle, and high-school levels. In their own study, involving twenty different professional development schools, Shriner et al. (2011) demonstrated a significant gain in teachers' confidence and competence in terms of their ability to incorporate educational technologies in the classroom setting. More importantly, according to the participants, the changes were perceived to be experienced in a relatively short period of time. Therefore, the results show that the lack of time may not be as significant of an impediment to the integration of technology in education as perceived to be. In contrast, however, in-service teacher education has been demonstrated to be the most influential in schools where support was routinely scheduled and sustained in the long-run by administration (Gresalfi & Cobb, 2011).

Vicarious experiences are one of the biggest influences on the self-efficacy of teachers of all levels (Wagler, 2011). According to self-efficacy theory, observing peers similar to oneself become successful through sustained effort substantially strengthens observers' beliefs that they too possess the capabilities to succeed in the observed activities (Bandura, 1994). The power of vicarious experiences is evident in a study conducted by Willis et al. (2016), in which a sample of 424 teachers participated in an educational technology course incorporating repeated exposure to vicarious experience-based lessons. The training, which mimicked vicarious mastery experiences, resulted in a statistically significant increase in teachers' technology integration self-efficacy, where over 78% of the variance in the results was attributed to the course (Willis, et al., 2016). Such courses may also be incorporated as prerequisites of enrolment into more extensive, ongoing teacher education programs, so that teacher students possess a comfortable perceived level of self-efficacy before engaging in more comprehensive field-based training.

However, in an online environment, teachers frequently report feelings of being isolated from their peers, limiting observation in contrast to a traditional face-to-face setting (Fine, 2016). Teachers do not reflect on their own practice when in isolation and specific, focused reflection is important for their professional development (Turner, 2012). As emphasized by Clarke and Hollingsworth (2002) in the Interconnected Model of professional growth (Figure 2), changes in teachers' beliefs on the efficacy of new practices is dependent on the eventual reflection of those practices into salient outcomes, where teachers draw new conclusions and eventually influence their existing beliefs. However, the context of the school does not only impact reflection, but can impede professional growth at "every stage of the professional development process: access to opportunities for professional development; restriction or support for particular types of participation; encouragement or discouragement to experiment with new teaching techniques; and, administrative restrictions or support in the long-term application of new ideas" (Clarke & Hollingsworth, 2002, p. 962). Therefore, it is important to understand the major differences between learning in the traditional classroom setting and learning in a virtual online context to help develop teacher education programs for online teaching.

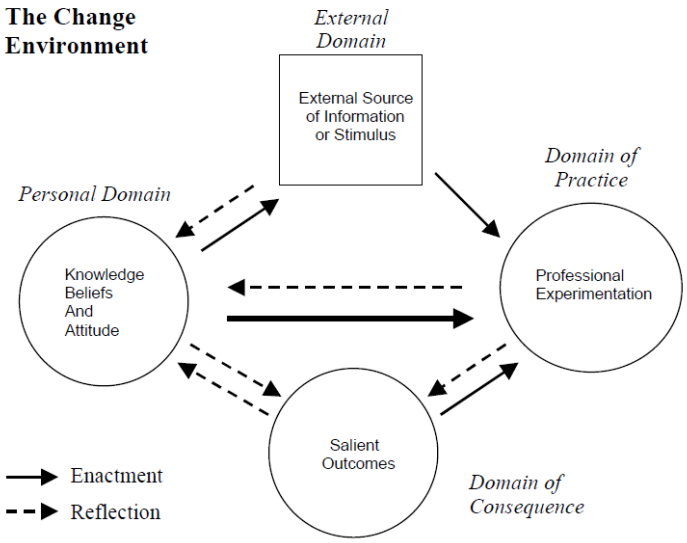

Figure 2: The interconnected model of professional growth (Clarke & Hollingsworth, 2002)

2.3. Traditional classroom learning versus online learning

Several of the differences expressed by teachers between the face-to-face classroom setting and the online environment are related to feeling a loss of control, where there is not much "in the moment control over the online environment" (Cook, 2018, p. 71). Part of this feeling may come from the change in role of the teacher, transitioning from a knowledge transmitter to a knowledge facilitator, where there is greater responsibility on students for their own learning (Cook, 2018). Several studies emphasize a greater responsibility on students for their own learning in an online course (Samah, et al., 2011). Cohen and Baruth (2017) further highlight that one of the most prominent learning styles in the context of online learning is self-regulated learning (SRL) and the increase in students' responsibility and engagement also means that the learning environment should be equitable and cater to a diverse range of interests and needs. Self-regulated learning can be defined as the "learners' systematic effort to manage their learning process to attain personal goals" where they "proactively set learning goals and engage in the process of achieving the goals, such as planning tasks, monitoring progress, and reflecting goal accomplishment" (Cho, et al., 2017, p. 11). Cho et al. (2017) further state that SRL plays an important role in the formation of a positive online learning environment and recommend that instructors and designers use strategies to promote students' SRL.

Swan (2001) asserts that in an asynchronous environment all students have an equal voice and no one student can dominate, leading students to perceive online discussion as being more democratic and equitable than face-to-face classroom discussion. The asynchronous nature, specifically, provides the opportunity for students, particularly more introverted ones, to spend time reflecting on their own contributions as well as their classmates' and edit their contributions before and even after posting them, without the stress of real-time interaction (Swan, 2001; Riggs & Linder, 2016). Despite the clear advantages of asynchronous online teaching, the active learning methods that are becoming ubiquitous and increasingly routine in face-to-face interaction, including synchronous online courses, are still difficult to conceptualize in asynchronous virtual settings (Riggs & Linder, 2016). As Cho et al. (2017) mention, stimulating engagement towards SRL in asynchronous courses is also the responsibility of the instructors because online students' engagement may be more of a perception than an actuality. Although technologies enhance the learning experience, the use of technologies alone does not necessarily make learning more engaging, and further aspects of constructivism are required (Croft, et al., 2010).

The perception that online students are more engaged and learn more most likely arises from the strong emphasis that is placed on online students to hold more responsibility for their own learning and to self-regulate (Louwrens & Hartnett, 2015). Gifted students, for example, are often found to apply more self-regulated learning strategies and self-regulation has also been consistently found to contribute more to academic success than intelligence (Peeters, et al., 2016). Oversight and accountability are weak in the majority of virtual schools, and motivated students who are proficient with the technology and subject matter are usually the only ones who do well (Morgan, 2015). Therefore, although more diligent online students may be able to achieve success and satisfaction in the virtual environment through SRL, it does not necessarily imply that the majority of online students will actively pursue self-regulated learning strategies and become more engaged. Other factors affect the extent to which students practice SRL in an online environment, including students' motivation, confidence, and learning styles (Cho, et al., 2017).

Online courses are dependent on the active involvement of a large number of students to be successful. However, these students come from a variety of backgrounds, prior knowledge, skills, and learning styles (Cohen & Baruth, 2017). Learning styles refer to the "concept that individuals differ in regard to what mode of instruction or study is the most effective for them" (Klašnja-Milićević, et al., 2011, p. 886). Samah et al. (2011) highlight a change in definition of personalization over the last few decades, evolving from an "adaptation of the learning process and content to individual characteristics and preferences" to "instruction that tailored learners' learning styles" (p. 518). Klašnja-Milićević et al. (2011) further agree that optimal instruction requires determining the "students' learning styles and tailoring instruction accordingly" (p. 886). However, part of the reason the focus in online courses is shifted away from learning styles and outcomes is the influence of technical and media considerations, and how the content can be formatted to be delivered online based on the available technologies (Sobel, et al., 2009). Therefore, another major criticism of online courses is that the information is merely distributed and not actually taught to students (Sobel, et al., 2009).

Referring back to the Community of Inquiry framework, Anderson (2017) argues that due to the recently increased focus on self-directed learning, the effectiveness of teaching in an online environment is equally dependent on the learners. The addition of a 'learner presence' element to the CoI model would incorporate components of self-regulation and push it beyond typical schooling contexts (Anderson, 2017). In contrast, it can be demonstrated that self-regulated learning is already a part of the CoI framework and can be viewed as the interaction between cognitive presence and teaching presence (Cho, et al., 2017), which would entail constructing meaning through ongoing communication, supported by design and facilitation. The CoI model also brings forth the concept of shared regulation, which is defined "as both self-regulation and co-regulation of cognition in online collaboration" (Cho, et al., 2017, p. 11). When students collaborate in an online environment, they also co-regulate fellow students' efforts, enhancing interactivity in online learning (Cho, et al., 2017). Incorporating SRL involves self-direction while being engaged in group-learning environments, recognizing their benefits (Kim, et al., 2014).

Chou et al. (2010) bring forth one dimension of interactivity in online courses as being the facilitation of interpersonal communication, which incorporates both synchronous and asynchronous channels of communication for students. Furthermore, Chou et al. (2010) highlight that learner-learner interaction in an online environment is based on the communication channels offered by the learning management system (LMS), where Samah et al. (2011) identify synchronous communication as one of the most influential interactive functions of learner-learner interaction. Thus, these studies further demonstrate that online courses that are entirely asynchronous may be seen as lacking the desired capacity to enhance communication and collaboration.

In online courses, verbal interactions are replaced by communication technologies (Fine, 2016). However, drawing on numerous previous studies, Yilmaz and Yurdugül (2013) emphasize that one of the most influential factors on the integration of communication technologies in an online environment to enhance interaction is the role of the instructor. In the online context, the instructor has a complex role as he or she "designs the online course to support student's cognitive development" and also facilitates "interactions among the students and between the instructor and the students" (Cho, et al., 2017, p. 10). Kim et al. (2014) further support the importance of instructors' roles in online teaching, emphasizing that SRL is valuable for enhancing motivation and retention, but it does not imply a lack of course design or structure, and also calls for the conceptualization of the instructor as a facilitator. Therefore, in addition to the role of a facilitator in the online context, the role of a designer holds significance, particularly in an asynchronous environment, to optimize the 'distribution' of information, as mentioned by Sobel et al. (2009), and to enhance interactivity and promote collaborative self-regulated learning.

2.4. Personalization in online education and the roles of instructors

Personalization in the field of education can be defined as allowing "multiple pathways for students to demonstrate their learning within an environment that supports their strengths, interests, and challenges while demanding the development of 21st-century competencies" (DeWaters, 2017, p.

221). Personalized technologies in education are ones that have been modified to individual students' needs and learning styles (Kucirkova & Flewitt, 2018). In addition, individual students want to achieve a specific level of competence within a certain amount of time, emphasizing the considerable variations in pace and progression that may be experienced (Klašnja-Milićević, et al., 2011). Blouin and Vogt (2017) further agree that personalization takes into consideration the most meaningful personal learning goals of each student, resonating with the key qualities of self-regulated learners stated by Cho et al. (2017), which include intrinsic goal orientation and high control of learning beliefs. Intrinsic goal orientation refers to concentrating on personally meaningful goals as opposed to universal external goals such as achieving good grades. Similarly, when students have high control over their learning, they are more likely to engage in personal goal setting and adjust their learning process as required to achieve their goals (Cho, et al., 2017). These adjustments are key to enhance students' motivation (Cho, et al., 2017), which Kim et al. (2014) have highlighted as one of the greatest obstacles impeding successful online education. Low motivation has been attributed by administrators as one of the most influential students' weaknesses leading to high turnover rates and poor performance (Kim, et al., 2014). Personalization allows teachers and students to know each other well, focusing on students' concerns and fostering a positive, motivating climate, leading to a greater students' sense of belonging (Rutledge, et al., 2015). Sobel et al. (2009) further support students' sense of belonging and emphasize that online students' degree of success is linked to their feelings of belonging to a learning community where they feel "like insiders instead of outsiders" (p. 31). Therefore, a strong link is evident between contemporary SRL and the concept of personalization, both of which focus on individualized learning styles and personal learning goals.

Feedback is a critical aspect of personalized learning and strongly influences the motivation of students participating in online education (Kim, 2012). Feedback, as mentioned by Hara (2000) as an important factor in students' satisfaction, has also been identified as a challenge to effectively incorporate into asynchronous courses (Cook, 2018). In a study conducted by Lloyd et al. (2012) involving ten primary schools and one secondary school, it was found that in a classroom setting a large proportion of students "felt happy, good, pleased or proud when hearing" feedback, which also

made them “more aware of what they were doing and how they could work better” (p. 246). The importance of feedback is therefore evident even among younger students, and with the rapid growth of online education, widespread virtual primary schooling may soon become a reality.

Major channels of online feedback as part of learner-instructor interaction consist of e-mail messaging, bulletin board systems, social tools, and synchronous communication (Samah, et al., 2011). Therefore, in an asynchronous online environment, the most influential channels are likely e-mail messaging and bulletin boards. Similarly, channels falling under learner-learner interaction also include e-mail messaging and bulletin board systems, with the addition of discussion forum systems (Samah, et al., 2011). In the classroom setting teachers have the opportunity to readily observe students to determine the way they interact and their level of participation. Teachers are able to immediately ask questions to check students’ understanding and give feedback in a timely manner (Qutoshi & Poudel, 2014). Similarly, an important component of personalized instruction using technology in the classroom is gathering and using immediate feedback on students’ understanding (Rubenstein, 2010). However, the real-time aspect of immediate checks of understanding may be challenging in an asynchronous environment, and therefore impose limitations on personalized instruction.

However, interaction and collaboration have been demonstrated to be enhanced in the online environment. Research conducted by Gürsul and Keser (2009) determined a statistically significant difference between face-to-face and online learning in the dimensions of task sharing, cooperation, and feedback. These dimensions were substantially more effective in an online environment. Most of the interaction was carried out through the LMS, e-mails, and e-groups, with only a small synchronous portion implemented through an instant messaging service (Gürsul & Keser, 2009). Studies show that student perceptions are highly influenced by the design of LMSs and communication technologies improve learning perception (Yilmaz & Yurdugül, 2013). Students perceive interactive and collaborative WBLTs more positively (Kay, et al., 2009), and learners’ satisfaction with online education is mainly correlated with the relevance and interactivity of the course taken (Barberà, et al., 2016).

Much of the literature on online learning and teaching concentrates on the social interaction between teachers and students, and also among students. The social context is an invaluable component of supporting effective learning, and reducing isolation while enhancing motivation (Sobel, et al., 2009). However, the more recent literature base is moving towards the interaction between students and the course content, recognizing the importance of the design aspect of the content, which should be "more than a glorified textbook consisting of lecture notes that are 'cut and pasted' into a course management system" (Sobel, et al., 2009, p. 29). Online discussions are an important part of the learning process in an online environment, promoting students' collaboration and interaction between students and teachers. The focus falls on the design of course, particularly the learning management system, because tools such as online discussion forums can be effectively integrated into the LMS (Yilmaz & Yurdugül, 2013).

Moreover, in a study conducted by Klašnja-Milićević et al. (2011), it was found that integrating Recommender Systems (RSs) into online learning management systems, similar to ones used in online retail to direct customers to certain products, enhanced personalized learning. Incorporating a RS into the LMS can provide a personalized system which adapts to the students' learning styles and knowledge levels and thus recommends online resources and activities to enhance learning and students' satisfaction (Klašnja-Milićević, et al., 2011). The dominant or preferred learning style of a student can be investigated by offering the learner a free choice of activities or examples to pursue in order to effectively determine his or her learning goals. Another important part of the concept of learning styles is the retention of new and difficult information, which should be a priority design consideration in the online context, particularly asynchronous environments, due to the flexibility students have in working at their desired pace. However, this strategy would still be dependent on the availability of an extensive and diverse array of resources and activities, and how they are incorporated into the LMS, resonating with the responsibilities falling under the designer and facilitator roles of instructors. Borup et al. (2014) state that one of the roles of teachers in an online school is that of an instructional designer who creates course content and learning activities, or chooses which ones to integrate and to what extent. Some studies show that if students are given more

control over how to display the content, there seems to be an increase in involvement (Louwrens & Hartnett, 2015).

However, personalized learning further requires a rich learning environment that focuses on an extensive and highly integrated set of competencies that students need to excel in diverse life situations (Kucirkova & Flewitt, 2018), resonating with the development of 21st-century competencies being an important part of personalization as stated by DeWaters (2017). The rapid spread of globalization and digitization in the 21st-century has put immense pressure on schools to evolve and respond to not only to students' social futures but the human capital demands of workplaces (Tan, et al., 2017). Educators and administrators further agree that developing these 21st-century competencies (21CC) will benefit students later on in their lives, but they are driven by school performance and the necessary skill development must be supported by teachers (Menten, 2015).

The three domains of skills (Figure 3) that give rise to these competencies are: cognitive, which focuses on academics for the mastery of core content as well as creativity and critical thinking; intrapersonal, which pertains to the personal emotions, attitudes, and behaviours that influence how students apply themselves; and, interpersonal, which encompasses the social competencies students need to relate to others, including communication and collaboration (Menten, 2015).

Figure 3: Three broad domains of "21st Century Skills" (Ontario Public Service, 2016)

Similarly, according to the Ontario Public Service in Canada (2016), the most prominent 21st-century competencies emphasized in international frameworks are critical thinking, communication, collaboration, and creativity and innovation. However, the province of Ontario also highlights self-awareness and global citizenship as competencies within its education policy, resonating with other advanced global regions such as Singapore, where adaptability and resilience in local, global, and virtual societies are considered as required 21CC (Tan, et al., 2017). Tan at al. (2017) argue that the technological globalization and the resulting digitization of everyday life requires adapting to the global presence of personal, mobile, and networked technologies which have essentially replaced routine mental and manual labour with innovative ideas and personalized services (Tan, et al., 2017).

Interestingly, the three broad domains of 21st-century skills are very similar to the components of the CoI framework, in which cognitive and social components are required for an educational experience in online learning, and align with the cognitive and interpersonal domains of 21st-century skills. Since personalization in the online environment has been linked with learners' self-efficacy, and self-efficacy and effort are dynamically associated with teaching and social presence, a learner presence component should be incorporated into a revised CoI model (Figure 4) to enhance the understanding of successful online learning (Shea & Bidjerano, 2010).

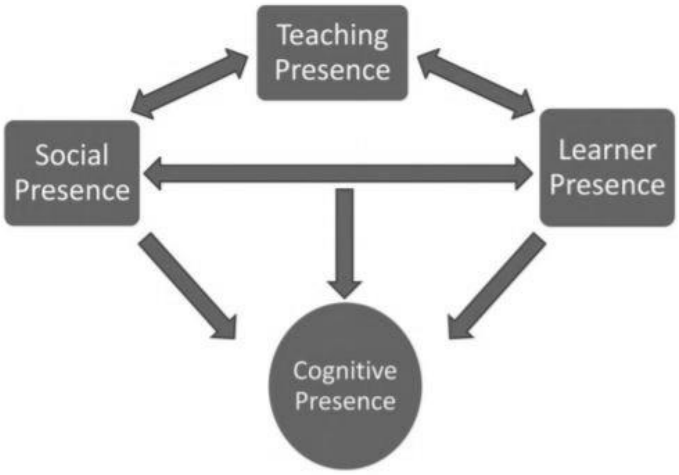

Figure 4: Revised Community of Inquiry model including 'learner presence' (Shea & Bidjerano, 2010).

The addition of the learner presence adds a component reflective of the intrapersonal set of 21st-century skills, further supporting the suitability of 'Communities of Inquiry' and the effectiveness of the online platform to enhance personalization and instill 21CC to a level that is perceived to be equivalent to that in a traditional classroom setting. It can be highlighted that the remaining component of the CoI model, teaching presence, emphasizes the importance of the role of the instructor in creating a nurturing environment that supports 21CC development through design and facilitation.

2.5. Teacher education for virtual schooling

As K-12 online education continues to grow and evolve, teachers need to be dynamically equipped with the knowledge and skills required to effectively teach in a virtual environment. Several states in the United States require that all students complete some form of online learning experience to graduate from high school (Barbour & Harrison, 2016). However, there has been very little focus in teacher education on virtual schooling and only a handful of states in the US have considered extensive professional development for teachers involved in online teaching (Barbour & Harrison, 2016). Furthermore, in the Canadian province of Ontario, online teaching is not a core content area of the initial teacher education program, which is described as the "first stage on the continuum of learning and development for new teachers" (Ontario Ministry of Education, 2015). However, the program does include technology integration into the classroom, primarily focusing on blended learning with synchronous components; further supporting Riggs and Lander (2016) in that many pedagogies are challenging to apply to asynchronous settings. Therefore, a professional development gap exists between pre-service teacher education and the roles new teachers may experience in virtual schools. The research literature demonstrates a steep learning curve for novice instructors when transitioning into the online environment, particularly when working with online courses that were previously developed by others and require modifications (Morris, et al., 2005). The high resistance to change likely stems from teachers' perceptions of their roles as teachers in the traditional classroom.

Efforts have been made to incorporate virtual schooling into pre-service teacher education in the US based on three identified roles of teachers in a virtual school environment: facilitator, instructor, and designer. For teachers, the ability to distance themselves from their own teaching methods is key to whether they will make significant changes in their practice. Deviating from the typical role of teaching or having multiple roles seems to help with this distancing so that teachers can critically reflect on their practice and eventually make changes (Turner, 2012). Therefore, while looking at teacher education of teachers in an online environment, it is important to acknowledge and emphasize that the roles involved in online teaching are not considered 'traditional' and the unclear role identity may facilitate reflection on practice towards changing teachers' beliefs of online teaching. However, as mentioned by Turner (2012), reflection cannot occur in isolation and social interaction, such as discussions with colleagues, is required to engage in effective reflection on practice. In contrast, some older studies argue that incorporating self-study in teaching and teacher education has the potential to significantly influence practice and promote reflective teaching (Dinkelman, 2003; Loughran, 2007). Studies show that reflection during in-service teacher education helps teachers realize that some pedagogical principles that were already valued in the traditional classroom setting may be applicable to the asynchronous environment as well (Cook, 2018). Therefore, in virtual courses that are asynchronous, the roles of instructors may significantly change, bringing forth important teacher education implications for online instruction.

According to Barbour and Harrison (2016), there are four aspects of virtual schooling that influence online teaching strategies: pedagogy, assessment, management, and technology. Similarly, Morris et al. (2005) identify four domains of teachers' responsibility in asynchronous online environments: pedagogical, social, managerial, and technological. It is important to note that while the categories proposed by both sets of researchers mostly resonate with each other, the social category of responsibility identified for asynchronous instruction further supports the importance of collaboration in asynchronous settings through feedback and interactivity.

Similarly, a collaborative school environment provides teachers with opportunities to engage in spontaneous reactive learning (Williams, 2003), through informal vicarious experiences and

interactions with peer coaches (Murray, et al., 2009). One-on-one consultations with mentors were ranked as very important to the course design process for asynchronous courses (Cook, 2018). However, in the context of a virtual school, teachers would have minimal face-to-face interaction with each other, if any, and therefore the benefits of informal vicarious experiences would be diminished. However, similar WBLTs can also be incorporated into teacher education at virtual schools, enhancing the collaborative aspect and demonstrating that innovations in online education are not only limited to students, but can be just as effective for teacher learners (Meij, et al., 2016). Online learning support, such as videos of experiential stories made available online, has been shown to effectively assist informal vicarious learning without face-to-face meetings. However, multi-stakeholder collaboration is required to successfully implement such hybrid learning programs (Meij, et al., 2016). Therefore, the goal is to develop teacher education programs for online teaching in virtual secondary schools based on the realization that in the workplace a large part of "teachers' learning is informal rather than formal, reactive rather than deliberative and collaborative rather than individual" (Williams, 2003, p. 207).

3. Methodology

An exploratory approach was adopted for this study to primarily develop an understanding of teachers' beliefs and roles related to online teaching and how they may be influenced by in-service teacher education to enhance personalization in asynchronous online courses. The purpose of selecting this approach was to measure the prevalence of various views among the teachers in the sample and combine the analysis with the prevalent trends in thought and opinion that were uncovered. The objective was to establish a sound base for further decision-making on the development of in-service teacher education programs in the studied context.

3.1. Research Questions

The interest in this study topic arose during my former role as the Principal of a part-time private high school offering small-sized classes that were tailored to the diverse needs and future interests of students. During my three-year tenure there were countless inquiries about the availability of online courses, particularly from student-athletes who were interested in completing high school credits while being abroad to participate in competitive sports events. A strong demand was experienced for asynchronous online learning, particularly for mathematics courses at the grade 12 level, where students could work at their own pace on key post-secondary prerequisites without attending any scheduled synchronous components. However, a concern among the teachers was whether providing online courses for any of the subjects offered would dilute the customized and personalized approach students were exposed to in the traditional classroom setting at the school. Therefore, the focus of this study is on teaching online in general rather than on specifically teaching mathematics online.

Thus, based on my past experiences and the growing prevalence of asynchronous virtual schooling in Ontario and the rest of Canada and the US, the following primary research question was developed for investigation. The primary research question was further supported by progressive secondary research questions that emerged during the study:

- **I.** How can personalized teaching be enhanced in asynchronous online high school courses?
- **IIa.** How do teachers' perception of online teaching influence the use of web-based learning technologies?
- **IIb.** To what extent does in-service teacher education of online teaching change teachers' perceptions?
- **IIc.** What impact does in-service teacher education have on teachers' use of learning technologies in asynchronous online classes?

3.2. Eligibility and Limitations

To be eligible to participate teachers must have been engaged in teaching at least one asynchronous online course at the grade 11 or grade 12 level with the authority to make course design modifications. There was a total of 15 teachers employed at both schools. Twelve of the teachers were involved in teaching at least one asynchronous online course at the senior secondary level and also had a considerable level of autonomy to modify course design, therefore meeting the inclusion criteria. All types of employment were considered, including full-time, part-time, and contract-based.

It is also important to note that at the time of the study three of the participants were also involved in teaching online courses, both synchronous and asynchronous, at the junior college level. However, all teachers were asked to complete the questionnaires and interviews based on their experience in the secondary school context. Furthermore, another potential limitation of the sample was that private high schools in the province of Ontario are not required to hire certified teachers, and therefore not all of the teachers interviewed had completed a pre-service teacher education program and could not comment on pre-service experiences. However, online teaching is not a core content area of the initial teacher education guidelines set by the Ontario Ministry of Education, and the focus of the study was concentrated on in-service teacher training.

3.3. Data Collection

Data was collected using a mixed methods sequential transformative design (Creswell, 2014), involving structured questionnaires and semi-structured interviews. The order of the two data collection phases was guided by the theoretical perspective developed during the analysis of the available research literature. Two questionnaires were circulated one after the other in the first phase, to collect mostly quantitative data on teachers' demographics, beliefs, and experiences related to online teaching. The second phase focused on qualitative data collection through informal interviews for teachers to contribute their opinions on how their beliefs and experiences particularly influenced personalized asynchronous teaching, and further share ideas for the development of in-service teacher

education for virtual schooling. Teachers were told that anonymously completing and submitting a questionnaire constituted as consent for participation, while an oral consent form was completed before the start of each interview.

3.3.1. Questionnaires

A publicly-available, interactive 'Readiness for Online Teaching Survey' (Appendix A), developed by the Texas A&M University-Texarkana was initially circulated to all of the teachers at both schools to develop an understanding of the current level of preparedness of teachers for online teaching and the extent of support that teachers may require. The questionnaire comprised of 35 questions that were divided into four sections, each focusing on a different aspect of online teaching: technical skills, experience with online teaching and learning, attitudes toward online learning, and time management and time commitment. Participants were asked to respond to each question based on a Likert scale with options ranging from strongly disagree, with a score of 1 point, to strongly agree, equivalent to 5 points. The interpretation of the final scores was divided into three categories of levels of readiness for online teaching: well-suited for online teaching, need support for success in online teaching, and need considerable training and support for success in online teaching. Based on an estimated completion time of 5-10 minutes per questionnaire, an informal response timeframe of two weeks was established to help guide teachers. All 12 teachers completed the questionnaire, and upon the collection and analysis of the responses, another more detailed paper-based questionnaire was circulated. The results from the initial 'Readiness for Online Teaching Survey' (ROTS) were important to 'confirm' a need for in-service support and training, further demonstrating the suitability of the teachers to be included in the research sample. The questionnaire helped develop a foundational understanding of the extent of training and support that may be required at the schools, based on the perceived proficiency levels of the teachers.

The paper-based 'Online Teaching Questionnaire' (Appendix B) consisted of a comprehensive combination of demographic, behavioural, and attitudinal questions. The goal of the questionnaire was to expand on the verified need for administrative support and training at the schools, and transition into perceptions of online personalization and in-service teacher education. It

was given out to all 12 teachers meeting the inclusion criteria at both schools and the response rate was approximately 92% (*n*=11). The questionnaires were completed anonymously and collected securely in a drop-box with access only to the Principal of each respective school, and myself. The questionnaire consisted of 24 questions within three major progressive parts: utilizing technology in the classroom, teaching online courses, and personalization in online teaching. A combination of question types was utilized in the questionnaire to develop a more thorough understanding of the factors that influence online teaching and how personalization may be enhanced in the online environment, particularly in asynchronous courses. The most common question types included were multiple-choice, open-ended, Likert scale, and question grids that also included rating scales.

While most of the questions were used to analyze teachers' perceptions of and experiences in online teaching, the open-ended questions focused on defining terms based on the teachers' opinions and adding any comments pertaining to the nature and importance of in-service teacher education, providing a transition into the semi-structured interviews. Due to the more detailed nature of the questions, an estimated completion time of 20-30 minutes per questionnaire was established. Teachers were again given an informal response timeframe of one month, however completed questionnaires submitted up to approximately six weeks after the initial date of circulation were still considered for quantitative data analysis.

3.3.2. Semi-structured interviews

Informal, semi-structured interviews were conducted to further explore some of the quantitative findings and develop a more qualitative understanding of teachers' perceptions and expectations of both pre-service and in-service teacher education programs for online teaching. Interviews were chosen due to the small sample size and the lack of opportunities to directly observe the teachers in an asynchronous environment (Creswell, 2014). They were ideal for providing single and focused qualitative data sources (Braza & Supapo, 2014), and according to Beswick (2012), interviews also allow the identification of contradictions within and between data sources. The informal aspect allows interviewees to feel the 'ownership' of the interaction, increasing the likelihood of responses that are relatively free from bias and exaggeration (Schostak, 2006).

The interviews were conducted over a period of two months, scheduled in thirty-minute time slots at the convenience of the teachers. The participation rate was 75% (*n*=9). Oral consent forms were signed in the presence of the interviewees and their permission was taken to make notes during the interview, as well as use direct quotes anonymously. Teachers were notified that there was no obligation to participate in an interview and interview participation was not contingent on the completion of the 'Online Teaching Questionnaire' (OTQ). Therefore, based on the participation rates of both questionnaires and interviews, there is a possibility that one of the teachers interviewed had only completed the initial 'Readiness for Online Teaching Survey'.

A specific set of predetermined questions was used during the interviews to cover the desired aspects of the study (Appendix C), although the interviewee responses mostly guided the direction, adding flexibility to the interview. The flexibility allowed me to "follow up interesting developments and to let the interviewee elaborate" on diverse topics (Alshenqeeti, 2014). While 30 minutes were allotted for each interview, the length ranged from approximately 15 minutes to 35 minutes, depending on the extent of elaboration and follow-up questioning. At the end of the interview, teachers were asked if there was anything else they would like to add or comment on related to their online teaching experience to ensure any issues of interviewees' interest had not been missed or insufficiently elaborated on.

The focus of approximately the first half of the questions was on teaching in an asynchronous online environment and the relevant teachers' roles perceived. Comparisons were also made between synchronous and asynchronous courses to analyze how much difference teachers perceived in the effectiveness between the two types. The latter half of the interview concentrated on personalized teaching in asynchronous courses and the nature of administrative support and training teachers would like to receive to help overcome the perceived barriers associated with asynchronous environments. Teachers' perceptions of informal vicarious learning were discussed to gain insight on a preferred structure of an in-service teacher education program that could potentially be implemented at the schools.

3.4. Ethical Considerations

Ethics approval was obtained from the Central University Research Ethics Committee (CUREC) for the questionnaires, preliminary draft of interview questions, consent forms, participant information sheet, and study poster. Letters were distributed to the Principals of the schools and their consent was confirmed before promoting the study within the schools. It was clearly explained to teachers that participation in any part of the study was completely voluntary and they may withdraw themselves and their responses at any time, without giving any reasons for withdrawal or facing any penalty or negative consequences. Several teachers had reservations on being audio-recorded during the interview and also using direct quotes in presenting the findings.

One of the most important aspects to consider was the affect the participation in this study could have on teachers' employment, particularly for contract-based instructors. Given the context of private schools where the Principals were also part owners, explicitly expressing the Principals' consent to teachers was crucial for them to feel reassured that any of their opinions and ideas would not affect their employment, even though this was clearly stated in the participant information sheet. Moreover, being in my position as a contract consultant for less a year, emphasizing the Principals' consent allowed teachers to feel more comfortable interacting with me and sharing strong personal opinions. Teachers were also notified that my contractual responsibilities focused on ministry-compliant course development and teacher education, and that I would not be involved in reviewing performance based on teachers' responses and comments.

4. Findings and Discussion

The findings are presented in a similar order to the literature review, progressing from teachers' beliefs about technology integration and online teaching to in-service teacher education for online asynchronous teaching. The results from the two questionnaires were largely analyzed in a quantitative manner but due to the small sample size (n<30), central limit theorem may not be applied, implying that the statistics of the sample may not be approximated to the parameters of the population

(Hogg, et al., 2015). Furthermore, the qualitative findings from the interviews are not conclusive and cannot be used to make generalisations about the population of interest.

4.1. Teachers' preparedness for online teaching

The ROTS consisted of three bands of scores, with each one being associated with an interpretation of the amount of support that may be required by the teacher to successfully teach online courses, as well as a corresponding proficiency level as an online instructor. The interpretations of the three score bands on the ROTS are as follows:

Level 3: 150-175 points = You are well suited to online teaching and are probably an *insider* or *master* online instructor

Level 2: 90-150 points = You are likely to need some support for success in online teaching and are probably an *apprentice* online instructor

Level 1: Below 90 points = You will need considerable training and support for success in teaching online and are probably a *visitor* or a *novice* online instructor

Out of the 12 questionnaires completed, the average score obtained was 124 points, falling approximately in the middle of the level 2 score band. Only one of the twelve teachers achieved a level 3 score, ending up with 151 points, while two teachers' scores were in the level 1 band, with 81 points and 87 points. The results provided a confirmatory basis to further pursue the teachers' opinions about teacher education for online teaching and build on the identified need for support and training. Interestingly, even the teacher with the highest score only narrowly made it into the level 3 band, leaving some room for interpretation about the comprehensiveness of his or her preparedness for online teaching. If the score would have been significantly higher than the level 3 threshold, it would allow for a stronger validation of an 'insider' proficiency level for the teacher, where he or she could be described as being in a "position to have special knowledge of the affairs of or to influence the decisions" of other teachers in the schools (Merriam-Webster, 2018).

The interpretations of the level 1 and level 2 score bands also state the representative learner's proficiency level. The level in which the average score of the teachers fell emphasizes that a score within that range is likely indicative of an 'apprentice' online instructor. The key word, apprentice, is specifically used in the US to highlight that the individual in question has a mentor present to systematically guide him or her throughout the learning process. The Cognitive Apprenticeship Model in educational practice emphasizes "a process by which learners learn from a more experienced person by way of cognitive and metacognitive skills and processes" (Dennen & Burner, 2007, p. 426). The model resonates with the concept of vicarious learning as stated in several studies, emphasizing the direct observation of more experienced peers to enhance learning and confidence (Wagler, 2011; Meij, et al., 2016; Willis, et al., 2016). Based on the interpretation of the average score of the twelve teachers, the proficiency levels suggest that there is an ongoing need for observations and reflections between a more experienced mentor and the teachers. However, from the results obtained it may be conjectured that only one of the twelve teachers possessed a level of experience sufficient for the role of a mentor, equivalent to approximately only 9% of the teachers.

Furthermore, the average percentage scores were calculated for each section of the ROTS. The lowest percentage scores were in the section titled 'Part II: Experience with Online Teaching and Learning' (Part II), followed by the last section, titled 'Part IV: Time Management and Time Commitment' (Part IV). Therefore, based on the results of the initial questionnaire, it was found that the lack of teacher confidence, including a lack of online teaching experience, and the lack of time significantly lowered teachers' preparedness scores; resonating with two of the barriers that impede technology integration in education, as identified by Kucirkova and Flewitt (2018) based on a survey of 170 teachers conducted by the British Educational Communications and Technology Agency (BECTA). One of the questions in Part II of the ROTS focused on whether teachers felt they had received relevant training for online instruction. The average score for the question was 2.25, reflecting a response of 'disagree'. The highest score obtained for that question was 4, or 'agree', which was only seen in two questionnaires, one of which belonged to the highest scoring teacher. Similarly, on the OTQs, 8 out of 11 teachers stated that they had not received adequate training during

the delivery of an online course, while one teacher stated that he or she was unsure. Therefore, approximately 73% of the teachers had not received adequate training for online course delivery, and only two out of the eleven teachers explicitly stated that adequate training had been received, equivalent to approximately 18%. In the US, less than 40% of K-12 teachers had received any kind professional development in online teaching, despite considerable efforts made to incorporate online teaching in pre-service teacher education programs in several states throughout the country (Barbour & Harrison, 2016). Therefore, a figure of less than 20% may seem accurate for Canada, as online teaching has yet to be included as a core competency in pre-service teacher education programs in any of the provinces or the territories.

However, one of the teachers who stated that adequate instructional support had been received, explicitly wrote on the OTQ that the professional development and the support received was not provided by the employer at any stage of his or her employment and had been pursued externally and paid for through personal finances. Similar responses were also received during the interviews, where over 50% of the teachers displayed a strong affinity for engaging in professional development for online teaching and were also willing to personally finance such training to help increase their confidence and comfort with the online teaching environment. The responses further confirmed a strong link between the level of teachers' confidence in technology use and the amount of in-service teacher education teachers receive, reflecting trends highlighted during the literature review.

Furthermore, it has been emphasized that self-efficacy is especially sensitive to vicarious experience when learners are unsure about their capabilities or have minimal prior experience (Willis, et al., 2016). Based on the results from the OTQs, the average number of years of teaching experience among the eleven teachers was more than 5 years and up to 7 years, whereas the average number of years of online teaching experience was considerably less, being more than 1 year and up to 3 years. Although many of the teachers felt comfortable teaching in a traditional classroom setting, due to the relevant experience they had accumulated in their careers thus far, self-efficacy related to using WBLTs and teaching online in both synchronous and asynchronous environments was found to be low. Expanding on the data further, over 75% of the teachers interviewed described their self-efficacy

as being “low”, “underdeveloped”, or “inadequate” for online teaching, particularly in an asynchronous environment. Moreover, the ROTS section concentrating on the technical skills associated with online teaching (Part I) did not receive the lowest percentage score. Therefore, out of the barriers of technology integration as mentioned in the literature review, the lack of effective teacher training, and the lack of teacher confidence associated with underdeveloped experience with online teaching were determined to be the most influential barriers to online teaching, followed by the lack of time. Technical problems or the lack of technical skills was not found to be as influential of an impediment to the integration of technology, supporting Shriner et al. (2010) and Willis et al. (2016) in that training for technology integration is more effective when it benefits the curriculum and clearly highlights the learning outcomes to enhance teachers’ confidence with the use of WBLTs, as opposed to the training of basic technical skills.

Furthermore, the overall attitude towards online teaching and learning seemed to be positive, with the scores in the attitudes section (Part III) scoring relatively high. The results were supported by comments made in the OTQs and interviews. Only 3 out of the 11 teachers, or approximately 27%, selected that they “believe that online courses reduce the quality of teaching and learning”. In contrast, 7 out of the 11 teachers, or approximately 64%, highlighted that they “believe that online courses enhance the quality of teaching and learning” and this belief was a contributing factor to their decision to teach or design a fully online course.

However, one teacher mentioned on the OTQ that one of the factors that has influenced, or would influence, his or her decision not to teach or design a fully online course is that there is “no value with online education”, as written by the teacher under the ‘Other’ option. Interestingly, the same teacher had highlighted on the OTQ that he or she had received adequate technical support for planning, modifying, and delivering an online course, as well as adequate instructional support for structuring and modifying course content, lesson planning and delivery, interacting with students, evaluating student work, and giving feedback in an online environment. Therefore, the results seemed somewhat contradicting in that despite acknowledging receiving adequate training in several aspects of online teaching, the teacher still did not value online education. However, this teacher was also the

only participant that identified the role of a ‘marker’ in online teaching as ‘very important’, valuing the roles of facilitator and designer as only ‘considerably important’. Further analyzing teachers’ opinions on the roles of instructors in asynchronous online teaching, the majority of teachers stated that as the class size increased, there was less time to attend to specific students’ needs and the only ‘value’ teachers could provide students was through posting clear instructions so there were as little misconceptions arising as possible, and marking student assessments within a reasonable amount of time so they were aware of their progress at regular, frequent intervals. Therefore, it is important to consider future research on the relationship between class size and the perceived roles of teachers in an asynchronous online course.

4.2. Teachers’ roles in asynchronous online teaching

Two teachers, each with an average of approximately 3 years of asynchronous online teaching, mentioned that the role of the teacher may become more of a marker as the class size increases. They mentioned that there is a “severe” lack of time to cater to each individual, including providing timely feedback. Similarly, there were only two OTQs that ranked the role of a ‘marker’ as being ‘very important’ in a virtual asynchronous online course. When considering the OTQs and the importance placed on each of the teachers’ roles in a virtual asynchronous online course, the three highest ranked roles as identified by the teachers were: designer, facilitator/moderator, and instructor, respectively. The roles reflect the three identified roles of teachers in a virtual school environment in the US when considering the development of pre-service teacher education programs. Scoring nearly as high as the role of an ‘instructor’ was the role of ‘technical support’, distantly followed by ‘marker’, which was mostly ranked as ‘not important’ or ‘slightly important’ in an asynchronous environment. However, the diluted importance of the role of a marker may likely be influenced by the nature of student assessments, where certain courses largely deliver assessments of learning in multiple-choice format, which are instantly marked electronically with the final grades being made available to students within a matter of minutes.

For the majority of teachers, the associated roles in online teaching were not considered traditional teaching roles and they felt a “huge” and “excessive” deviation from the perceived roles of teachers in a classroom. When asked about designer role presence in a traditional face-to-face setting, a few teachers explained that the process of designing in the classroom does not typically involve the use of technology, and designing courses for online delivery requires at least a basic proficiency in the associated technology and a certain comfort level for interacting with students in the online context. Turner (2012) emphasizes that deviating from the typical role of teaching or having multiple roles, as is likely the case in virtual asynchronous teaching, helps teachers to critically reflect on their practice and eventually make pedagogical changes. Similarly, Clarke and Hollingsworth (2002) emphasize change as adaptation where teachers adapt their practices to changed conditions and contexts, which is closely linked to change as learning, emphasizing that teachers learn in a community. Therefore, the unclear role identity in a virtual setting may provide an ideal platform to facilitate reflection on practice towards changing teachers’ beliefs of online teaching in a community setting. A supporting trend was seen between the number of years of experience with online teaching and the desire to work with a mentor to learn further about effective online teaching. Instructors with less experience teaching online expressed a keen interest and a strong desire to work with a mentor.

4.3. Enhancing personalized teaching

The third section of the ‘Online Teaching Questionnaire’ starts by asking teachers how they would define ‘personalized teaching’ in their own words. Several diverse responses were obtained, with many of them emphasizing key words. The frequency of the key themes was tabulated (Table 1). The results resonated with the evolving definitions of personalization in the field of education, shifting from a focus solely on students’ learning styles to the emergence of important required competencies that will help shape students into successful global citizens by broadening their skillsets, a process that is initiated in school (Menten, 2015; Tan, et al., 2017). However, several curricula around the world have yet to incorporate teaching and learning strategies for the development of these important life competencies.

Key words	Frequency	Percentage
Learning styles	7	64%
Students' needs	7	64%
Personal goals	3	27%
Needs assessment	2	18%
Student-centered	2	18%
Life competencies	1	9%
Learning Outcomes	1	9%

Table 1: Frequency table of key themes identified in personalized teaching

Approximately two thirds of the respondents highlighted catering to diverse learning styles and/or understanding individual students' needs as being part of personalized teaching. Several other key themes were emphasized, many of which were mentioned either alongside the learning styles of students or their needs. However, it is interesting to note that 'life competencies' and students' 'learning outcomes' were both part of the same response. Therefore, based on the figures shown in Table 1, only approximately 9% of the teachers identified key words more closely associated with the contemporary definition of personalization in the field of education, representing a similar proportion of teachers identified as possessing a level of experience suitable to a mentor. When asked during the interviews about 21st-century competencies, none of the teachers had comprehensive knowledge of 21CC but three out of the nine teachers interviewed were able to elaborate on how technology is advancing at such a rapid rate that students will have to possess a vast amount of knowledge and will have to become proficient in a wide array of techniques to become successful and stay competitive later on in life. Similarly, Tan et al. (2017) emphasize that substantial investments must be made in teacher education and educational research to develop twenty-first century pedagogy and practice to make sure students are well-prepared for the future. A clear and thorough 21CC framework should be integrated into the academic curriculum, supported by Ministry of Education policy.

It has been shown that instructors that value student-centered approaches are more likely to support the integration of technologies in their pedagogies (Cho, et al., 2017). However, the frequency of 'student-centered' was lower than expected. The low count of 'student-centered' in the responses could possibly indicate that even though teachers recognized the effective use of technologies in the classroom to enhance student-centered learning in line with views of social constructivism, they are not as confident about the effectiveness of the asynchronous environment in enhancing student-centered teaching and thus, personalized teaching. Although the question did not specifically focus on personalized teaching in a virtual environment, the question immediately followed the title of the questionnaire section, 'Part III – Personalization in online teaching', potentially influencing the teachers' thoughts when responding to the question.

However, several teachers agreed that providing students with instructional material in various formats, such as in video, audio, and downloadable handouts would be 'highly effective' in enhancing personalized teaching in a fully asynchronous. Furthermore, teachers also felt that 'setting individualized learning goals and success criteria' would be an effective approach, with all of the teachers either rating the process as either 'highly effective' or 'considerably effective'. Therefore, the designer role again becomes increasingly important to incorporate a wide array of tools, resources, and activities into the course LMSs to work towards enhancing personalization in asynchronous online courses. As mentioned by Klašnja-Milićević et al. (2011), RSs may be incorporated into LMSs to determine which activities would be suitable for each student based on his or her learning styles.

Interestingly, while delivering instructional material in a wide variety of formats was found to be effective in enhancing personalized teaching, 'allowing students to customize their portal layout' and 'adding choice of completing alternative assignments' were both mostly considered either 'not effective' or 'slightly effective'. While elaborating this during interviews it was found that the majority of teachers perceived giving students too much choice in course customization and assessments of learning as a loss of control, as identified by Cook (2018), and also a means for students to lose focus and maybe even become further confused and distressed. It therefore makes sense that 'giving student feedback in more timely manner' was ranked mostly as 'highly effective'.

4.4. Teacher education for online teaching

All nine teachers agreed during their interviews that learning from first-hand experience is a powerful way of improving confidence in the workplace. There are several modes of influence that fall under vicarious learning and enhance efficacy beliefs and improve performance, including actual modeling, symbolic modeling, and videotaped modeling (Willis, et al., 2016). Learning from first-hand vicarious experience is a cyclic process going through four major steps: observing and reflecting, forming concepts and generalisations, testing the formed concepts in new contexts, and experiencing concretely (Meij, et al., 2016). However, observing others' experiences does not necessarily have to be conducted in synchronous face-to-face meetings. Hybrid e-learning tools can be applied to teacher education programs, not only to deliver audio-visual recordings of the experiences of peers and mentors, but to deliver them in an asynchronous online environment to enhance the comfort of teachers with online learning before they can be used to for students as well.

The teachers expressed a keen interest in an in-service teacher education program that utilizes similar WBLTs that teachers may find useful in designing their own asynchronous course pages. The concept of 'dynamic' asynchronous course pages is one that teachers may find difficult to visualize and interacting with them as a teacher student would help them build an understanding of students' perceptions of asynchronous learning. Therefore, the program would essentially be a pilot project which could be mimicked and replicated for use with students. However, if implemented at a larger scale and with a more permanent intention, it would require careful selection of recorded field-based experience and student teachers' learning pertaining to their content areas and grade levels (Barbour & Harrison, 2016).

5. Conclusion

Canada has been acknowledged as a leader in online education (Nzimande, 2016), however, this recognition is likely a result of the large number of online programs offered in the country, and not necessarily due to the quality of online teaching and learning. Most of the online courses and fully

virtual programs are delivered at the post-secondary level, and have been developed and enhanced over the span of several years. Furthermore, most of these courses contain both synchronous and asynchronous components to offer a wide range of communication channels for both instructor-learner interaction and learner-learner interaction (Murphy, et al., 2011). In contrast, online courses at the high school level follow a similar format among the vast majority of virtual secondary schools, being completely asynchronous (Murphy, et al., 2011); and are created to be fully functional within a relatively short period of time, with minimal modification or enhancement, if any, on a continual basis. Therefore, not only do the differences between the formats at the secondary and post-secondary levels potentially create a gap in the effectiveness of students' learning, the rapid onset at the secondary level also inadequately prepares teachers to teach online effectively. Therefore, future research could possibly look at the differences between the design and delivery of online courses at the secondary and the post-secondary levels, to identify gaps in students' levels of preparation to engage in online learning in university.

Teachers' beliefs are very difficult to influence and the same is applicable for teachers' attitudes towards online teaching and learning. It seems that although teachers have a positive attitude towards online teaching and acknowledge that it potentially stimulates self-regulated learning, the use of WBLTs in course design is strongly based on the associated learning outcomes. If teachers have a clear understanding of the potential outcome of the technological tools being used and how they enhance students' learning, they are much more likely to adopt these technologies in their pedagogical techniques. Therefore, teacher education specifically focused on the learning outcomes of the teachers' students can significantly change teachers' perceptions on the use of WBLTs and online teaching. However, in an asynchronous environment, teachers find it more difficult to conceptualize some of the pedagogical approaches they are more confident with and have more experience using in face-to-face settings.

Concentrating on learning outcomes can also be used as an approach to enhance personalized teaching in an asynchronous online environment, by working on the development of 21st-century competencies as eventual outcomes of students' learning. The increasing importance of 21CC as

prerequisites for young adults to become positive contributors to their futures (Tan, et al., 2017), and their inclusion in contemporary definitions of personalization, make them ideal foci for teacher education research in the given context. Furthermore, there is a significantly noticeable gap between teachers' definitions of personalized teaching and widely acceptable descriptions in the research literature; where teachers are largely unaware of the concept of 21CC, and only a very small proportion of secondary school teachers are likely to have knowledge of 21CC and how they can be enhanced in the traditional and virtual classrooms. The gap in definitions provides a capitalizable opportunity for the development of teacher education programs that address these gaps towards achieving effective online teaching, particularly enhancing personalized teaching in asynchronous online courses.

The trend of educational policy around the world towards the instilment of 21CC in secondary school students is inadequately highlighted in the corresponding curricula, particularly within the province of Ontario. Although the Ontario Public Service has highlighted pedagogical tools that can effectively build 21CC, there is no mention of these tools and techniques in the curriculum. Currently, the Ontario secondary school subject curriculum documents each contain a section about the goals of Ontario secondary schools for the twenty-first century. The Ministry of Education highlights a goal of supporting "high-quality learning while giving individual students the opportunity to choose programs that suit their skills and interests" (Ontario Ministry of Education, 2014). The curriculum further highlights that a "broader range of learning options outside traditional classroom instruction" are available to allow all learners to eventually "develop the knowledge, skills, and perspectives they need to be informed, productive, caring, responsible, healthy, and active citizens in their own communities and in the world" (Ontario Ministry of Education, 2014). Therefore, there is a clear recognition of the diversity in students' interests and learning styles, as well as mention of "future-ready skills" to prepare learners for global citizenship (Tan, et al., 2017, p. 428), but the overarching idea of 21st-century competencies is still incomprehensively incorporated.

Therefore, the inclusion of 21CC, as identified by the Ontario Public Service, into the Ontario Ministry of Education subject curricula would provide a platform to develop in-service teacher

training that is specifically aligned with the curriculum, potentially enhancing its effectiveness for the integration of technologies in teaching, as mentioned by Willes et al. (2016), and eventually online teaching. In-service training provided in virtual schools can also effectively incorporate vicarious learning through asynchronous means, such as real experiences recorded on video and pre-recorded audio-based storytelling, where the learners and learning facilitators are not required to meet at the same time (Meij, et al., 2016). Such a structure of a teacher education program also allows teachers to put themselves in the students' shoes in an asynchronous environment, to assess the effectiveness of a wide array of web-based learning tools on students' learning and self-regulation.

Therefore, with the prevalence of virtual schools increasing at a significant rate, both in Canada and the US, it is important to enhance research and development of relevant teacher education programs. From the perspective of a teacher educator, the asynchronous online environment is an ideal platform to further promote the contemporary teacher educator role of a facilitator and enhance 'research informed' teacher education that puts emphasis on methods enabling more experienced teachers to articulate their knowledge and pedagogical techniques through collaborative dialogue and planning with less experienced teachers (Burn & Mutton, 2015). The exchange of stories is an effective method for making teachers aware of their professional contextual identities (Korthagen, 2004), and excellent teacher education tasks have been defined as ones that have the ability to simulate and sustain fruitful learning interactions (Baturo, et al., 2007). These desirable characteristics are readily available through a vast array of tools, which can be effectively integrated into asynchronous teacher education.

However, as a large majority of virtual schools in Canada are privately owned, it is also worthwhile to look at private virtual schools from a business perspective. Even if virtual schooling is not as effective as traditional methods, demonstrating a significant economical advantage may showcase a justifiable replacement for traditional schooling contexts (Barbour & Reeves, 2009). Future research could possibly further analyze the trade-off between cost-effectiveness and the quality of students' learning in virtual environments.

6. References

Alghamdi, A. M. & Prestridge, S., 2014. *Principal and teacher beliefs about online learning technologies.* Adelaide, ACEC2014.

Alshenqeeti, H., 2014. Interviewing as a Data Collection Method: A Critical Review. *English Linguistics Research,* 3(1), pp. 39-45.

Anderson, T., 2017. *How communities of inquiry drive teaching and learning in the digital age,* Thunder Bay: Contact North.

Bandura, A., 1994. Self-efficacy. In: V. Ramachaudran, ed. *Encyclopedia of Human Behavior.* New York: Academic Press, pp. 71-81.

Barberà, E., Gómez-Rey, P. & Fernández-Navarro, F., 2016. A cross-national study of teacher's perceptions of online learning success. *Open Learning: The Journal of Open, Distance and e-Learning,* 31(1), pp. 25-41.

Barbour, M. K., 2012. *State of the Nation: K-12 Online Learning in Canada,* Victoria: Open School BC.

Barbour, M. K. & Harrison, K. U., 2016. Teachers' perceptions of K-12 online: Impacting the design of a graduate course curriculum. *Journal of Educational Technology Systems,* 45(1), pp. 74-92.

Barbour, M. K. & Reeves, T. C., 2009. The reality of virtual schools: A review of the literature. *Computers & Education,* 52(2), pp. 402-416.

Baturo, A., Cooper, T., Doyle, K. & Grant, E., 2007. Using three levels in design of effective teacher-education tasks: The case of promoting conflicts with intuitive understandings in probability. *Journal of Mathematics Teacher Education,* 10(4), pp. 251-259.

Bennett, S. & Woloshyn, V. E., 2003. *Teacher Education Working Group Recommendations for Teacher Education in the Province of Ontario Summary Report,* Toronto: Learning Disabilities Association of Ontario.

Beswick, K., 2012. Teachers' beliefs about school mathematics and the mathematicians' mathematics and their relationship to practice. *Educational Studies in Mathematics,* Volume 79, pp. 127-147.

Blouin, S. & Vogt, K., 2017. Defining Personalization: Students As Agents and Teachers As Coaches. *Education Week,* 26 June.

Borup, J., Graham, C. R. & Drysdale, J. S., 2014. The nature of teacher engagement at an online high school. *British Journal of Educational Technology,* 45(5), pp. 793-806.

Braza, M. T. & Supapo, S. S., 2014. Effective Solutions in the Implementation of the K to12 Mathematics Curriculum. *SAINSAB,* Volume 17, pp. 12-23.

Burn, K. & Mutton, T., 2015. A review of 'research-informed clinical practice' in Initial Teacher Education. *Oxford Review of Education,* 41(2), pp. 217-233.

Cho, M.-H., Kim, Y. & Choi, D., 2017. The effect of self-regulated learning on college students' perceptions of community of inquiry and affective outcomes in online learning. *The Internet and Higher Education,* Volume 34, pp. 10-17.

Chou, C., Peng, H. & Chang, C.-Y., 2010. The technical framework of interactive functions for course-management systems: Students' perceptions, uses, and evaluations. *Computers & Education,* Volume 55, pp. 1004-1017.

Clarke, D. & Hollingsworth, H., 2002. Elaborating a model of teacher professional growth. *Teaching and Teacher Education,* Volume 18, pp. 947-967.

Cohen, A. & Baruth, O., 2017. Personality, learning, and satisfaction in fully online academic courses. *Computers in Human Behavior,* Volume 72, pp. 1-12.

Confrey, J., 1995. A Theory of Intellectual Development. *For the Learning of Mathematics,* 15(2), pp. 36-45.

Cook, J. P., 2018. Online Education and the Emotional Experience of the Teacher. *New Directions for Teaching and Learning,* 153(1), pp. 67-75.

Creswell, J. W., 2014. Chapter 10: Mixed Methods Procedures. In: *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* London: SAGE Publications Ltd..

Croft, N., Dalton, A. & Grant, M., 2010. Overcoming Isolation in Distance Learning: Building a Learning Community through Time and Space. *Journal for Education in the Built Environment,* 5(1), pp. 27-64.

Crowe, A. R. & Berry, A., 2007. Teaching prospective teachers about learning to think like a teacher: Articulating our principles of practice. In: T. Russell & J. Loughran, eds. *Enacting a Pedagogy of Teacher Education: Values, relationships and practices.* Abingdon: Routledge, pp. 31-44.

Dennen, V. P. & Burner, K. J., 2007. The Cognitive Apprenticeship Model in Educational Practice. In: 3rd, ed. *Handbook of Research on Educational Communications and Technology.* Oxon: Taylor & Francis Group, pp. 425-439.

DeWaters, C., 2017. Getting Personalization Right!. *The Reading Teacher,* 71(2), pp. 221-224.

Dinkelman, T., 2003. Self-Study in Teacher Education. *A Means and Ends Tool for Promoting Reflective Teaching ,* 54(1), pp. 6-18.

Fine, K. A., 2016. Online Education: The Relationship Between the Perceptions of Online High School Teachers Compared to Traditional Classroom Teachers Regarding the Visual Arts. *Electronic Theses and Dissertations,* Volume Paper 3118, pp. 1-153.

Forgasz, H. & Leder, G., 2008. Beliefs about Mathematics and Mathematics Teaching. In: P. Sullivan & T. Wood, eds. *Knowledge and Beliefs in Mathematics Teaching and Teaching Development.* Rotterdam: Sense Publishers.

Garrison, D. R., Anderson, T. & Archer, W., 2000. Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education,* 2(2-3), pp. 87-105.

Gresalfi, M. S. & Cobb, P., 2011. Negotiating Identities for Mathematics Teaching in the Context of Professional Development. *Journal for Research in Mathematics Education,* 42(3), pp. 270-304.

Gürsul, F. & Keser, H., 2009. The effects of online and face to face problem based learning environments in mathematics education on student's academic achievement. *Procedia Social and Behavioral Sciences,* Volume 1, pp. 2817-2824.

Hara, N., 2000. Student distress in a web-based distance education course. *Information, Communication & Society,* 3(4), pp. 557-579.

Hassenburg, A., 2009. Distance Education Versus The Traditional Classroom. *Berkeley Scientific Journal ,* 13(1), pp. 7-10.

Hogg, R. V., Tanis, E. A. & Zimmerman, D. L., 2015. *Probability and Statistical Inference.* 9th ed. Upper Saddle River: Pearson Education.

Hurson, A. R., Sedigh, S., Miller, L. & Shirazi, B., 2011. *Enriching STEM education through personalization and teaching collaboration.* Seattle, WA, 2011 IEEE International Conference on Pervasive Computing and Communications Workshops, pp. 543-549.

Kay, R., Knaack, L. & Petrarca, D., 2009. Exploring Teachers Perceptions of Web-Based Learning Tools. *Interdisciplinary Journal of E-Learning and Learning Objects*, Volume 5, pp. 27-49.

Kim, C., 2012. The role of affective and motivational in designing personalized learning environments. *Educational Technology Research and Development,* 60(4), pp. 563-584.

Kim, R., Olfman, L., Ryan, T. & Eryilmaz, E., 2014. Leveraging a personalized system to improve self-directed learning in online educational environments. *Computers & Education,* Volume 70, pp. 150-160.

Klašnja-Milićević, A., Vesin, B., Ivanović, M. & Budimac, Z., 2011. E-Learning personalization based on hybrid recommendation strategy and learning style identification. *Computers & Education,* Volume 56, pp. 885-899.

Korthagen, F. A., 2004. In search of the essence of a good teacher: towards a more holistic approach in teacher education. *Teaching and Teacher Education,* Volume 20, pp. 77-97.

Kucirkova, N. & Flewitt, R., 2018. The future-gazing potential of digital personalization in young children's reading: views from education professionals and app designers. *Early Child Development and Care,* pp. 1-15.

Levin, T. & Wadmany, R., 2005. Changes in Educational Beliefs and Classroom Practices of Teachers and Students in Rich Technology-based Classrooms. *Technology, Pedagogy and Education,* 14(3), pp. 281-308.

Loughran, J., 2007. Researching Teacher Education Practices: Responding to the Challenges, Demands, and Expectations of Self-Study. *Journal of Teacher Education,* 58(1), pp. 12-20.

Louwrens, N. & Hartnett, M., 2015. Student and Teacher Perceptions of Online Student Engagement in an Online Middle School. *Journal of Open, Flexible, and Distance Learning,* 19(1), pp. 27-43.

Meij, M. G. v. d., Kupper, F., Beers, P. J. & Broerse, J. E., 2016. Hybrid e-learning tool TransLearning: video storytelling to foster vicarious learning within multi-stakeholder collaboration networks. *International Journal of Lifelong Education,* 35(4), pp. 413-429.

Menten, A., 2015. *Developing 21st Century Competencies for All Students.* Auckland, Asia Society Center for Global Education.

Merriam-Webster, 2018. *Definition of Insider.* [Online]
Available at: https://www.merriam-webster.com/dictionary/insider
[Accessed 2 September 2018].

Morgan, H., 2015. Online Instruction and Virtual Schools for Middle and High School Students: Twenty-First-Century Fads or Progressive Teaching Methods for Today's Pupils?. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas,* 88(2), pp. 72-76.

Morris, L. V., Xu, H. & Finnegan, C. L., 2005. Roles of faculty in teaching asynchronous undergraduate courses. *Journal of Asynchronous Learning Networks,* 9(1), pp. 65-82.

Murphy, E., Rodríguez-Manzanares, M. A. & Barbour, M., 2011. Asynchronous and synchronous online teaching: Perspectives of Canadian high school distance education teachers. *British Journal of Educational Technology,* 42(4), p. 583–591.

Murray, S., Ma, X. & Mazur, J., 2009. Effects of Peer Coaching on Teachers' Collaborative Interactions and Students' Mathematics Achievement. *The Journal of Educational Research,* 102(3), pp. 203-212.

Nzimande, B. E., 2016. *Canada a Leader in Online, Open and Flexible Learning,* Thunder Bay: Contact North.

Ontario Ministry of Education, 2014. *The Ontario Curriculum, Grades 9 to 12: French as a Second Language.* [Online]
Available at: http://www.edu.gov.on.ca/eng/curriculum/secondary/fsl912curr2014.pdf
[Accessed 31 August 2018].

Ontario Ministry of Education, 2015. *Initial Teacher Education.* [Online]
Available at: http://www.edu.gov.on.ca/eng/teachers/ITE/resources/accreditation.html
[Accessed 30 July 2018].

Ontario Public Service, 2016. *21st Century Competencies: Foundation Document for Discussion,* Ottawa: Ontario Government.

Peeters, J. et al., 2016. Teacher differences in promoting students' self-regulated learning: Exploring the role of student characteristics. *Learning and Individual Differences,* Volume 52, pp. 88-96.

Pelton, J., 2014. Assessing Graduate Teacher Training Programs: Can a Teaching Seminar Reduce Anxiety and Increase Confidence?. *Teaching Sociology,* 42(1), pp. 40-49.

Ploeg, G. V., 2012. K-12 Online Teacher Beliefs: Relationships Among Intelligence, Confidence, Teacher-Student Interactions, and Student Outcomes. *ProQuest Dissertations and Theses,* pp. 1-133.

Qutoshi, S. & Poudel, T., 2014. Student Centered Approach to Teaching: What Does it Mean for the Stakeholders of a Community School in Karachi, Pakistan?. *Journal of Education and Research,* 4(1), pp. 19-33.

Riggs, S. A. & Linder, K. E., 2016. *Actively Engaging Students in Asynchronous Online Classes,* Corvallis: IDEA.

Rubenstein, G., 2010. Ten Tips for Personalized Learning via Technology. *Edutopia,* 26 April.

Rutledge, S. A., Cohen-Vogel, L., Osborne-Lampkin, L. & Roberts, R. L., 2015. Understanding Effective High Schools: Evidence for Personalization for Academic and Social Emotional Learning. *American Educational Research Journal,* 52(6), pp. 1060-1092.

Sadler, I., 2013. The role of self-confidence in learning to teach in higher education. *Innovations in Education and Teaching International,* 50(2), pp. 157-166.

Samah, N. A., Yahaya, N. & Ali, M. B., 2011. Individual differences in online personalized learning environment. *Educational Research and Reviews,* 6(7), pp. 516-521.

Schostak, J., 2006. *Interviewing and Representation in Qualitative Research,* Maidenhead: Open University Press.

Shea, P. & Bidjerano, T., 2010. Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education,* Volume 55, pp. 1721-1731.

Shifflet, R. & Weilbacher, G., 2015. Teacher Beliefs and Their Influence on Technology Use: A Case Study. *Contemporary Issues in Technology and Teacher Education,* 15(3), pp. 368-394.

Shriner, M. et al., 2010. Social Studies Instruction: Changing Teacher Confidence in Classrooms Enhanced by Technology. *The Social Studies,* Volume 101, pp. 37-45.

Skott, J., 2009. Contextualising the notion of 'belief enactment'. *J Math Teacher Educ,* Volume 12, pp. 27-46.

Sobel, D. M., Sands, D. I. & Dunlap, J. C., 2009. Teaching Intricate Content Online: It Can Be Done and Done Well. *Action in Teacher Education,* 30(4), pp. 28-44.

Swan, K., 2001. Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education,* 22(2), pp. 306-331.

Tan, J. P.-L., Choo, S. S., Kang, T. & Liem, G. A., 2017. Educating for twenty-first century competencies and future-ready learners: research perspectives from Singapore. *Asia Pacific Journal of Education,* 37(4), pp. 425-436.

Thompson, A., 1984. The Relationship of Teachers' Conceptions of Mathematics and Mathematics Teaching to Instructional Practice. *Educational Studies in Mathematics,* 15(2), pp. 105-127.

Turner, F., 2012. Using the Knowledge Quartet to develop mathematics content knowledge: the role of reflection on professional development. *Research in Mathematics Education,* 14(3), pp. 253-271.

Volery, T. & Lord, D., 2000. Critical success factors in online education. *The International Journal of Educational Management,* 14(5), pp. 216-223.

Wagler, R., 2011. The Impact of Vicarious Experiences and Field Experience Classroom Characteristics on Preservice Elementary Science Teaching Efficacy. *Electronic Journal of Science Education,* 15(2), pp. 1-28.

Williams, A., 2003. Informal Learning in the Workplace: a case study of new teachers. *Educational Studies,* 29(2-3), pp. 207-219.

Willis, J., Weiser, B. & Smith, D., 2016. Increasing teacher confidence in teaching and technology use through vicarious experiences within an environmental education context. *Applied Environmental Education & Communication,* 15(3), pp. 199-213.

Yilmaz, E. O. & Yurdugül, H., 2013. The perception of learning in asynchronous online discussions: A scale development study. *Procedia - Social and Behavioral Sciences* , Volume 83, pp. 776-780.

Zhao, J. & McConnell, D., 2008. Teachers' Conceptions of E-Learning in Chinese Higher Education: Findings of Phenomenographic Study. *Computer Science and Software Engineering,* Volume 5, pp. 392-395.

7. Appendices

7.1. Appendix A – Readiness for Online Teaching Survey

Readiness for Online Teaching Survey

This is an interactive form. Please choose the answer which best reflects your opinions or attitudes regarding online education. This is a self-evaluation; no-one will see the results. Please be honest and answer each question for a true appraisal of your readiness for online teaching. Your score and its interpretation appears at the bottom of the survey.

	1 Strongly Disagree	2 Disagree	3 Neither Disagree or Agree	4 Agree	5 Strongly Agree		
Part I: Technical Skills							
I have a computer available to me at home or in the office.	○	○	○	○	○		
I travel with a computer.	○	○	○	○	○		
I access the Internet frequently and can search the Internet for what I need.	○	○	○	○	○		
I am competent and using e-mail.	○	○	○	○	○		
I am competent in using word processing software.	○	○	○	○	○		
I am able to download files from the Internet and can attach files to an e-mail.	○	○	○	○	○		
I am competent in using presentation software such as PowerPoint.	○	○	○	○	○		
I am familiar with and can create a blog.	○	○	○	○	○		
I am familiar with and can create wikis or Web sites.	○	○	○	○	○		
I am familiar with and can use social networking technologies, such as Facebook and Twitter.	○	○	○	○	○		
I am familiar with my university's learning management system.	○	○	○	○	○		
I have used technology to support my face-to-face teaching.	○	○	○	○	○		

Part II: Experience with Online Teaching and Learning							
I have experienced at least one online course as a student.	○	○	○	○	○		
I have received training in online instruction.	○	○	○	○	○		
I have used online quizzes in teaching my classes.	○	○	○	○	○		
I have used online discussions and teaching my classes.	○	○	○	○	○		
I have used virtual classroom tools like GoToMeeting, Adobe Connect, WebEx, or Skype in teaching my classes.	○	○	○	○	○		
I have used chat in teaching my classes.	○	○	○	○	○		
I have used a publisher web site in teaching my classes.	○	○	○	○	○		
I have used my university's learning management system to supplement my classroom teaching.	○	○	○	○	○		

Part III: Attitudes toward Online Learning							
I believe that online learning is as rigorous as classroom instruction.	○	○	○	○	○		
I believe that high quality learning experiences can occur without interacting with students face-to-face.	○	○	○	○	○		
I support the use of discussion as a means of teaching.	○	○	○	○	○		
I support learner-to-learner interaction and collaborative activity as a central means of teaching.	○	○	○	○	○		
I recognize that community building is an important component of online teaching.	○	○	○	○	○		
I encourage students to bring life experiences into the classroom and create activities that draw on those experiences.	○	○	○	○	○		
I believe that lecture is the best way to convey content in mind discipline.	○	○	○	○	○		
I feel comfortable communicating online and feel that I'm able to convey who I am in writing.	○	○	○	○	○		
I am a critical thinker and can develop assignments that encourage critical thinking in my students.	○	○	○	○	○		

Part IV: Time Management and Time Commitment							
I am able to log in to an online course at least once a day.	○	○	○	○	○		
I am able to post my online class at least four to five times per week.	○	○	○	○	○		
I am able to manage my time well.	○	○	○	○	○		
I am flexible in dealing with students on such issues as due dates, absences, and makeup assignments.	○	○	○	○	○		
I am fairly organized and tend to plan ahead in my teaching.	○	○	○	○	○		
I am responsive to my students, responding to e-mail within 48 hours and assignments within one week.	○	○	○	○	○		
Your score is:	**0**						
Interpretation of results							
150-175 points= You are well suited to online teaching and are probably an insider or master online instructor.							
90-150 points= You are likely to need some support for success in online teaching and are probably an apprentice online instructor.							
Below 90 points= You will need considerable training and support for success in teaching online and are probably a visitor or a novice online instructor.							
Find out where to begin on the Online Faculty Development Path.							

7.2. Appendix B – Online Teaching Questionnaire

ONLINE TEACHING QUESTIONNAIRE

Part I – Utilizing technology in the classroom

1. How many years of **teaching experience** do you have regardless of the type of employment?

Less than 1 year	More than 1 year and up to 3 years	More than 3 years and up to 5 years	More than 5 years and up to 7 years	More than 7 years
☐	☐	☐	☐	☐

2. How many years of **online teaching** experience do you have regardless of the type of employment?

Less than 1 year	More than 1 year and up to 3 years	More than 3 years and up to 5 years	More than 5 years and up to 7 years	More than 7 years
☐	☐	☐	☐	☐

3. Which of the following course formats have you either taught, planned, and/or designed? *(Please check all that apply.)*

   - ☐ Traditional medium to large size face-to-face classroom
   - ☐ Traditional one-to-one or small size face-to-face classroom
   - ☐ Hybrid with face-to-face classroom component and online component
   - ☐ Completely online with synchronous components
   - ☐ Completely online and fully asynchronous
   - ☐ Other *(Please describe)*:

     _____
     _____
     _____

4. In a traditional classroom face-to-face setting, approximately what percentage of the time is technology utilized?

Less than 10%	More than 10% and up to 25%	More than 25% and up to 50%	More than 50% and up to 75%	More than 75%
☐	☐	☐	☐	☐

5. Please indicate if any of the following obstacles exist and to what degree they limit or hinder the use of technology at a personal level (such as tablets or computers) in **classroom teaching** *(Please check all that apply.)*

	Does not exist	Exists but **not an influence**	Exists and is a **minor influence**	Exists and is a **major influence**
My own limited technological skills	☐	☐	☐	☐
Inadequate opportunities for teachers to use technology	☐	☐	☐	☐
Lack of support from technical staff	☐	☐	☐	☐
Lack of flexibility in decision-making	☐	☐	☐	☐
An inadequate number of technological devices available	☐	☐	☐	☐
Hardware performance issues such as lack of compatibility with software or slow internet connection	☐	☐	☐	☐
Inadequate opportunities for professional development related to technology use	☐	☐	☐	☐
Excessive amounts of time I need to spend developing content for technology-based instruction	☐	☐	☐	☐
Lack of administrational support	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____ _____ _____	☐	☐	☐	☐

6. Which of the following factors contributed to your decision **to teach or design** a fully online course? *(Please check all that apply.)*

- ☐ I am fairly comfortable with the general technology used in teaching online
- ☐ I am comfortable with the learning management system used in the school
- ☐ I believe that online courses enhance the quality of teaching and learning
- ☐ I do not believe that no face-to-face interaction with students is a disadvantage
- ☐ There is satisfactory technical support for online course development and delivery
- ☐ There is satisfactory administrational support for online course development and delivery
- ☐ I am familiar with specialized and effective pedagogies for teaching online
- ☐ Other teachers show a positive interest in teaching online
- ☐ Online teaching does not take more time than teaching in a classroom
- ☐ There is adequate time to modify course content online
- ☐ There is adequate time to independently learn about online teaching
- ☐ There is sufficient opportunity to observe and learn from colleagues about online teaching
- ☐ The school administration values online teaching
- ☐ Other *(Please be as specific as possible)*:

  _____

7. Which of the following factors influenced, or would influence, a decision **not to teach or design** a fully online course? *(Please check all that apply.)*

- ☐ I am not comfortable with the general technology used in teaching online
- ☐ I am not comfortable with the learning management system used in the school
- ☐ I believe that online courses reduce the quality of teaching and learning
- ☐ I believe that that no face-to-face interaction with students is a disadvantage
- ☐ There is inadequate technical support for online course development and delivery
- ☐ There is inadequate administrational support for online course development and delivery
- ☐ I am not familiar with effective pedagogies for teaching online
- ☐ Other teachers do not show a positive interest in teaching online
- ☐ Online teaching takes more time that teaching in a classroom
- ☐ There is inadequate time to modify course content online
- ☐ There is inadequate time to independently learn about online teaching
- ☐ There is insufficient opportunity to observe and learn from colleagues about online teaching
- ☐ The school administration does not value online teaching
- ☐ Other *(Please be as specific as possible)*:

  _____

Part II – Teaching online courses

8. Have you used any of the following features in teaching **fully online courses**? *(Please check all that apply.)*

	Haven't used	Haven't used but would be interested	Have used
Calendars and schedules	☐	☐	☐
Videos of lectures or lessons	☐	☐	☐
Downloadable lesson handouts	☐	☐	☐
Online class discussions	☐	☐	☐
Emails to and from students	☐	☐	☐
Online forums and blogs	☐	☐	☐
Online testing	☐	☐	☐
Podcasts and other recorded audio lessons	☐	☐	☐
Electronic grading of tests and assignments	☐	☐	☐
Anti-cheating and anti-plagiarism tools	☐	☐	☐
List of modules and recommended time limits	☐	☐	☐
Links to external webpages to references	☐	☐	☐
Other *(please describe)*: _____ _____ _____ _____ _____	☐	☐	☐

9. What kind of support would you require to teach an online course? *(Please check all that apply.)*

   ☐ Pedagogical support
   ☐ Technical support
   ☐ Administrational support
   ☐ A 24-hour help line
   ☐ Other support or resources *(Please describe)*:
   _____
   _____

10. Have you received adequate **technical support** for planning and/or modifying your online course?

    ☐ Yes ☐ No ☐ Not sure

11. Have you received adequate **technical support** during delivery of your online course?

    ☐ Yes ☐ No ☐ Not sure

12. Have you ever attended professional development workshops or other training for teaching online?

    ☐ Yes ☐ No ☐ Not sure

13. Please indicate if you have received **instructional support** for each online course aspect listed.

	Yes, received support	No, but would like to receive support	No, do not need or want support
Structuring and modifying course	☐	☐	☐
Lesson planning and delivery	☐	☐	☐
Interacting with students	☐	☐	☐
Evaluating student work	☐	☐	☐
Class discussion and giving feedback	☐	☐	☐

14. How important are the following roles for a teacher in a virtual **asynchronous** online course?

	Not important	Slightly important	Considerably Important	Very important
Instructor	☐	☐	☐	☐
Facilitator/moderator	☐	☐	☐	☐
Technical support	☐	☐	☐	☐
Designer	☐	☐	☐	☐
Marker	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐

15. How many **hours** do you spend to **develop and design a new in-class** course?

N/A	0 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	Over 35
☐	☐	☐	☐	☐	☐	☐	☐	☐

16. How many **hours** do you spend to **modify an existing in-class course** to suit your preferences?

N/A	0 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	Over 35
☐	☐	☐	☐	☐	☐	☐	☐	☐

17. How many **hours** do you spend to **develop and design a new fully online** course?

N/A	0 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	Over 35
☐	☐	☐	☐	☐	☐	☐	☐	☐

18. How many **hours** do you spend to **modify an existing fully online** course to suit your preferences?

N/A	0 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	Over 35
☐	☐	☐	☐	☐	☐	☐	☐	☐

Part III – Personalization in online teaching

19. How would you define 'personalized' teaching?

_____
_____
_____
_____

20. Please indicate if any of the following obstacles exist in the school and to what degree they limit or hinder **personalized teaching in online courses** *(Please check all that apply.)*

	Does not exist	Exists but **not an influence**	Exists and is a **minor influence**	Exists and is a **major influence**
Lack of support from school administration	☐	☐	☐	☐
My own limited knowledge of effective personalized teaching	☐	☐	☐	☐
Too many students or high diversity in student learning	☐	☐	☐	☐
Lack of flexibility in curriculum requirements	☐	☐	☐	☐
Inadequate opportunities in professional development in personalized instruction	☐	☐	☐	☐
Pressure to cover specific material according to Ministry or school standards	☐	☐	☐	☐
Inadequate technical support to modify software or learning management system	☐	☐	☐	☐
Excessive amounts of time I need to spend developing personalized content	☐	☐	☐	☐
Inadequate time available to personalize content	☐	☐	☐	☐

21. Which of the following processes do you think would be effective in personalized teaching in an online course? *(Please check all that apply.)*

	Not effective	Slightly effective	Considerably effective	Highly effective
Tailoring the pace of instruction to individual student needs	☐	☐	☐	☐
Tailoring the content of instruction to individual student needs	☐	☐	☐	☐
Providing additional educational support services	☐	☐	☐	☐
Reflecting on and discussing teaching and learning with students	☐	☐	☐	☐
Allowing students to provide feedback on teaching	☐	☐	☐	☐
Increasing teacher authority to modify emphasis on topics within Ministry requirements	☐	☐	☐	☐
Providing post-secondary advice or guidance to students	☐	☐	☐	☐
External links to a variety of supporting lessons and activities	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____ _____	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____ _____	☐	☐	☐	☐

22. For which of the following processes have you **received support or training from school administration** for online courses? *(Please check all that apply.)*

	N/A to course	Not received	Not received but interested	Received
Tailoring the pace of instruction to individual student needs	☐	☐	☐	☐
Tailoring the content of instruction to individual student needs	☐	☐	☐	☐
Providing additional educational support services	☐	☐	☐	☐
Reflecting on and discussing teaching and learning with students	☐	☐	☐	☐
Allowing students to provide feedback on teaching	☐	☐	☐	☐
Increasing teacher authority to modify emphasis on topics within Ministry requirements	☐	☐	☐	☐
Providing post-secondary advice or guidance to students	☐	☐	☐	☐
External links to a variety of supporting lessons and activities	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____ _____	☐	☐	☐	☐

23. Would you like to add any other comments about the nature and importance of **school administration support and training for online teaching**?

    _____
    _____
    _____
    _____

24. Which of the following processes do you think would be effective in enhancing **personalized teaching in a fully asynchronous environment**? *(Please check all that apply.)*

	Not effective	Slightly effective	Considerably effective	Highly effective
Allowing students to customize their portal layout	☐	☐	☐	☐
Adding choice of completing alternative assignments	☐	☐	☐	☐
Providing options for course grading breakdowns	☐	☐	☐	☐
Increasing the amount of time allocated as online 'office' hours	☐	☐	☐	☐
Developing personalized timelines for course progress	☐	☐	☐	☐
Setting individualized learning goals and success criteria	☐	☐	☐	☐
Giving student feedback in more timely manner	☐	☐	☐	☐
Adding a greater variety of course activities	☐	☐	☐	☐
Delivering lessons in various formats such as in video, audio, and in-print handouts	☐	☐	☐	☐
Other *(please describe)*: _____ _____ _____	☐	☐	☐	☐

THANK YOU FOR YOUR PARTICIPATION IN THE QUESTIONNAIRE

7.3. Appendix C – Preliminary scope of interview questions

Preliminary Scope of Interview Questions

1. How many years of teaching experience do you have?

2. How would you describe your competence level as a teacher?

3. How important is utilizing technology in the classroom? Why?

4. How would you compare traditional face-to-face courses and asynchronous online courses? What are the advantages and disadvantages of each?

5. Out of the roles of a teacher in an asynchronous online course, which one would you like to develop further or feel like you would require support to develop further? Why?

6. Do you feel there the role of the teacher in online courses is related to the workload present?

7. In what ways did administrational support and training sessions influence your engagement with online teaching overall?

8. How would you define personalized teaching? Is it possible to deliver personalized teaching online?

9. What do you feel are the obstacles to achieving highly personalized teaching in an asynchronous online course?

10. What additional features have you worked on recently to enhance personalized teaching in an asynchronous environment?

11. Would you like to comment on pre-service and in-service teacher education for online teaching?

12. Would you like to comment on anything else that has shaped or influenced your online teaching experience?